



Joint XXIV International Grassland and XI International Rangeland Virtual Congress Kenya 2021

25th - 29th October 2021



CONGRESS REPORT

Sustainable Use of Grassland
and Rangeland Resources for
Improved Livelihoods





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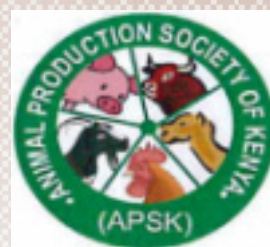


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Acronyms and Abbreviations

APSK	Animal Production Society of Kenya
ASSAR	Adaptation at Scale in Semi-Arid Regions
CSU	Colorado State University
DSA	Daily Subsistence Allowance
FAO	Food and Agriculture Organization of the United Nations
GoK	Government of Kenya
IGC	International Grassland Congress
IRC	International Rangeland Congress
ILRI	International Livestock Research Institute
IGAD	Inter Government Authority on Development
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IUCN	International Union for Conservation of Nature
KALRO	Kenya Agricultural and Livestock Research Organization
KES	Kenya Shilling
KICC	Kenyatta International Convention Centre
KWS	Kenya Wildlife Services
MALFC	Ministry of Agriculture, Livestock, Fisheries and Cooperatives
NOC	National Organizing Committee
SDL	State Department for Livestock
USDA-NRCS	United States Department of Agriculture – Natural Resources Conservation Service
USDA-ARS	United States Department of Agriculture – Agriculture Research Service
UoN	University of Nairobi
USD	United States Dollar
UNITA	Instituto Nacional de Tecnología Agropécuaria
UniMI	University of Milan

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Preface

The Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MALF&C), through the State Department for Livestock, has the mandate to provide policy direction and capacity building in the management of grassland and rangeland in Kenya. The MALF&C, in conjunction with the Animal Production Society of Kenya (APSK) and the Kenya Agricultural and Livestock Research Organization, successfully hosted the 24th International Grassland and 11th International Rangeland Joint Congress from October 25 to 29, 2021.

I would like to thank the President of IRC Continuing Committee and the Chairman of IGC Continuing Committee for having given us an opportunity to host the Joint International Congress. This was the first-ever joint Congress was held in Africa in its 100-year history and the first virtual Congress in the history of both IGC and IRC congresses. The State Department for Livestock committed to supporting the Congress mainly because rangeland and grassland cover over 80% of the country and provide livelihoods to over 10 million Kenyans. This area supports approximately 70% of the national livestock herd and about 85% of the wildlife that supports the country's tourism industry. However, the rangeland lack the basic foundations for social and economic development and are often food and nutrition insecure.

Rangeland and grassland face many challenges, including but not limited to uncontrolled grazing, soil erosion, land degradation, climate change, droughts and floods, encroachment from crop production and human settlement. Also, there is inadequate and fluctuating availability of fodder and water to support both livestock and wildlife. Additionally, low modernization of the rangeland causes Kenyan pastoralists, the major players in those areas, to suffer losses from drought and consistently produce livestock including cattle, small ruminant and camels, below their potential.

The theme of the Congress was “**Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods**”. The theme aligns with the Big Four Agenda of Kenyan economic development strategy, which includes the food and nutrition security pillar. Livestock is a key enterprise in the rangeland and grassland of Kenya and it is the main source of milk, meat and other livestock products. The beef demand in Kenya is expected to increase by over 170 % by 2050 due to increasing number of Kenyans in the middle income bracket. It is against this background that my Department supported this Congress.

I am impressed to note that Congress has enabled our rangeland and grassland research stations to be recognized globally as having been at the forefront in breeding some of the best native pastures varieties in the world, such as *Brachiaria ruziziensis*, *Pennisetum clandestinum* and *Chloris gayana*, among others. In addition, our researchers had the privilege to participate, share and exchange their experience, knowledge and information with the international community. I, therefore, expect that the proceedings from this forum will document successes, challenges, lessons learnt, and outcomes of this unique Congress, which will go a long way in enhancing the sustainable utilization of the grassland and rangeland resources in Kenya.

The total number of delegates who attended the Congress online was 675, and the total number visiting the virtual exhibition booths were 1,344. The MALF&C had the highest number of

visits (226), followed by ‘Welcome to Kenya’ (224) and KALRO (203), indicating the interest the delegates had in the host country and hence the publicity that Kenya received. There were excellent online discussions, and people followed the Congress through social media platforms, including YouTube. I wish to appreciate the conference’s National Organizing Committee for coordinating the process to its conclusive and successful end. I also would like to take this opportunity to thank Protel Studios Limited, who within a very short time provided a virtual platform on which the Congress was ran quite successfully.

Finally, I would like to thank all those who contributed to the success of the Congress by providing financial support and presenting well-researched papers in line with the Congress theme.

Harry Kimtai CBS

Principal Secretary

State Department of Livestock

Ministry of Agriculture, Livestock, Fisheries and Cooperative,

Chair, National Organizing Committee (NOC)

Executive Summary

Grassland covers over 26% of the world's landmass and about 80% of agricultural area, while rangeland covers 54% of the global terrestrial surface. Rangeland and grassland are a source of livelihood for about 1 billion people globally. In developing countries, livestock contributes 40% of the global value of agricultural output, supporting over 60% of rural households keeping livestock in the eastern Africa drylands. Over 60% of the red meat is produced from rangeland and grassland in Kenya.

During the 23rd International Grassland Congress (IGC) meeting held in New Delhi, India, the Kenya delegation bid to host the 24th IGC in Kenya in 2019 was granted. There were discussions with the IGC Continuing Committee for Kenya to host a Joint Congress with the International Rangeland Congress (IRC). The discussions yielded fruit during the 10th IRC Congress held in August 2016 in Saskatoon, Canada. As a result, Kenya was awarded the rights to host the Joint 24th IGC and 11th IRC Congress with the theme: - **“Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods”**.

The objectives of the Joint Congress were to promote the exchange of knowledge, showcase Kenyan research experience, stimulate interest in promoting development of grassland and rangeland, and focus on the enhanced livelihood of people living in those areas in Kenya and around the world. The Principal Secretary of State Department for Livestock in the MALF&C, chaired the National Organising Committee (NOC) to steer the Congress. The NOC comprised six sub-committees that ran the different components of Congress. The Sub-Committees were; Publications; Program; Publicity; Local Arrangements; Tours and, Finance and Fundraising.

The initial plan was to have an in-person Congress in Nairobi on 25th – 29th October 2020. However, due to the COVID-19 pandemic, a decision was made to hold a virtual Congress on 25th – 29th October 2021. The Congress attracted 675 participants from across the globe. A total of 392 papers were presented, comprising 173 oral and 219 poster presentations. In addition, nine keynote speakers gave an overview of each of the congress sub-themes. The majority of the papers presented during the Congress were from developing countries, with 166 coming from the Kenyan scientific community. The various exciting presentations and panel discussions provided unmatched opportunities for interactions and networking. Specifically, the Congress provided a platform for stakeholders including researchers, practitioners, critical decision-makers as well as other high-profile shapers of the grassland and rangeland ecosystems in the public and private sectors, and the civil society to share their work and help shape the emerging global agenda on a wide range of grassland and rangeland issues.

The papers presented during the Congress covered the following sub-themes: (i) range/grassland Ecology, (ii) forage production and utilization, (iii) livestock production systems, (iv) wildlife, tourism and multi-facets of rangeland/grassland, (v) drought management and climate change in rangeland/grassland, (vi) pastoralism, social, gender and policy issues, and (vii) capacity, institutions and innovations for sustainable development in rangeland/grassland.

There were key lessons learnt from hosting the Congress virtually and they included:

- a. leadership and financial support by the host government (Government of Kenya for this case) is critical for the success of a Congress of this magnitude;
- b. the decision to have a virtual congress should be made in good time, and the organizing

committee should ensure that all facilities required to support the virtual platform are put in place in good time for a seamless process;

- c. it is important even with virtual Congress to have the organizers manage it from a central point with robust internet connectivity and ICT facilities (compatible screens, address system, computer software etc.)
- d. the deadline for submission of virtual exhibitions should be done at least two months before the Congress dates to allow for uploading and training of the exhibitors on using the virtual platform
- e. pre-recording all presentations is very useful for virtual congresses, especially where internet connectivity is unstable to ensure a seamless process
- f. integrating different media types is important in disseminating congress information to enhance wider participation
- g. employing good and effective local ICT platforms and website co-hosting is key in full control and management of the event
- h. in future, even without the restricts of movement, organizers of such congresses can embrace a hybrid type (both in-person and virtual) to enable wider participation, and
- i. the hosting of the virtual Congress demonstrated Kenyan-based service providers' existence to host virtual international events. This homegrown capacity should be supported and strengthened.

1.0 Introduction and Background Information

Grassland covers over 26% of the world's landmass and about 80% of agricultural area, while rangeland covers 54% of the global terrestrial surface. Rangeland and grassland are a source of livelihood for about 1 billion people globally. In developing countries, livestock contributes 40% of the global value of agricultural output, supporting over 60% of rural households who keep livestock in East Africa drylands. Rangeland and grassland generate many essential goods and services, including livestock and other ecosystem services. At the same time, over 75% of the livestock and 60% of the wildlife are found in rangeland and grassland, underscoring the importance of these ecosystems. In Kenya, over 60% of the red meat is produced from rangeland and grassland.

The International Grassland Congress promotes exchange of information on all aspects of natural and cultivated grassland. It promotes forages crops for the benefit of humankind, including sustained development, food production and maintenance of biodiversity. The International Rangeland Congress promotes the interchange of scientific and technical information on all aspects of rangeland research, planning, development, management, extension, education, and training. Both IGC and IRC are held every four years. Although the IRC was held once on the African continent, the IGC has not.

During the 23rd International Grassland Congress (IGC) meeting held in New Delhi, India, the Kenya delegation bid to host the 24th IGC in Kenya in 2019 was granted. There were discussions with the IGC Continuing Committee for Kenya to host a Joint Congress with the International Rangeland Congress (IRC). The discussions yielded fruit during the 10th IRC Congress held in August 2016 in Saskatoon, Canada. As a result, Kenya was approved to host the Joint 24th IGC and 11th IRC Congress.

In its bid to host the Joint Congress, Kenya gave a strong justification, which included the following:

1. Kenya has a rich history of grassland/rangeland research and development in East Africa and dates back to the early 1960s. Through that research, indigenous pastures grasses were developed and shared worldwide. Among the grass species collected from the wild and developed were *Brachiaria species*, *Pennisetum Cladestinum* (Kikuyu grass) and *Chloris gayana* (Rhodes grass).
2. Kenya has a diverse ecosystem of wild fauna and flora that is home to huge numbers of wildlife including the famous 'big five'; lion, leopard, rhino, elephant and African buffalo. Kenya was keen to share experiences and scientific knowledge in the management of grassland and rangeland for the management and conservation of wildlife as well as underscore the importance of the East Africa savannah grassland in supporting large concentration of wildlife.
3. Kenya desires to reignite interest and investment in rangeland and grassland research and development to drive the global livestock industry and wildlife management. She looked forward to benefiting from hosting such a learning platform for the exchange of information,

knowledge, and skills in the field of grassland, rangeland and livestock research and practice.

The theme of the Congress was: **“Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods”**, and the main objectives were; (i) to promote the exchange of knowledge, (ii) showcase Kenyan research experience, and (iii) stimulate interest and focus on the livelihood of people living in the grassland and rangeland in Kenya. The timing and subject were critical, coming at a time when Kenya, through the Big 4 Agenda, sought to balance overall economic growth with the challenges of feeding a growing population, and using its natural resources effectively without harming its environment. There is no doubt that practical innovations were needed to meet these challenges.

After Kenya was given the right to host the conference, a National Organizing Committee (NOC) led by the Principal Secretary, State Department for Livestock was formed with membership for organizations/stakeholders interested in grassland and rangeland development (Table 1). The Kenya Agricultural and Livestock Research Organization (KALRO) was identified as the secretariat for the NOC to support in the day to day preparation for the Congress. The Director General KALRO was the chairman of the NOC secretariat and formed a broad-based secretariat that included members from KALRO, MALF&C, ILRI and APSK. The NOC secretariat comprised a total of 6 Sub-Committees: Publications, Program, Publicity, Local Arrangements, Finance and Fundraising.

Table 1: Membership of the National Organizing Committee of the Joint IGC-IRC Nairobi 2021

Name	Institution	Email Address
Mr. Harry Kimtai	PS SDL	pslivestock@kilimo.go.ke
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Dr. Elkana Nyambati	KALRO	elkana.nyambati@kalro.org
Prof. Jesse Njoka	UoN	jtnjoka@gmail.com
Dr. Ann Notenbaert	CIAT	a.notenbaert@cgiar.org
Dr. Foustine Wandera	KALRO	Foustine.wandera@kalro.org
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Dr. David Mwangi	KALRO	David.Mwangi@kalro.org
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Dr. George Keya	KALRO	George.keya@kalro.org
Dr. Alice Murage	KALRO	Alice.murage@kalro.org
Dr. Iain Wright	ILRI	i.wright@cgiar.org
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Dr. Michael Okoti	KALRO	michael.okoti@kalro.org
Dr. Patrick Watete	SDL	pwatete@gmail.com
Ms. Florida Maritim	KALRO	Florida.maritim@kalro.org
Mr. Stephen Odipo	KALRO	Stephen.odipo@kalro.org
Ms. Helen Omukoko	KTB	helen@ktb.go.ke
Mr. Isaac Masinde	Internal Security	Isaacmasinde0@gmail.com
Mr. Moses Boit	KALRO	Moses.Boit@kalro.org
Ms. Primrose Nabwire	KALRO	Primrose.wanyama@kalro.org
Mr. Nathan Maweu	KALRO	Nathan.maweu@kalro.org

Sub-Committee Reports

2.0 Sub-Committee Reports

This section highlights the functioning of each committee in contributing to the success of the Congress.

2.1 Programme Sub-Committee

The Program Sub-Committee was established under the Congress guidelines and was responsible for creating a rich and interactive Congress program that encompassed comprehensive plenary sessions, tours and poster sessions. The terms of reference of the committee included the following;

- (i). Develop overall congress programme
- (ii). Develop sub theme topics
- (iii). Develop format for individual sessions
- (iv). Manage session/workshop and organize for;
 - (a) Opening ceremony
 - (b) Plenary sessions
 - (c) Concurrent sessions
 - (d) Poster sessions
 - (e) Business meetings (IRC/IGC)
 - (f) Closing ceremony

Table 2: Membership of the Program Sub-Committee

Name	Institution	E-mail address
Prof. Jesse Njoka	University of Nairobi	jtnjoka@gmail.com ; jesse.njoka@uonbi.co.ke
Dr. An Notenbaert	CIAT	a.notenbaert@cgiar.org
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Dr. David Miano	KALRO	David.mwangi@kalro.org
Dr. Samuel Mbuku	APSK/KALRO	Samuel.Mbuku@kalro.org
Dr. David Kamau	KALRO	David.Kamau@kalro.org
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Dr. Chris Magero	IUCN	chris.magero@iucn.org
Dr. Patrick Watete	State Department for Livestock	pwatete@gmail.com

Over the planning period since 2017, the Program Sub-Committee made regular progress reports to NOC and collaborated with other Congress NOC sub-committees and especially the Publication sub-Committee. The following are the highlights of the how the committee addressed its TORs.

Implementation of the Congress Program

The sub-program committee delivered the IGC/IRC congress program as outlined below.

Congress Programme Development

The Congress programme was developed by first fine-tuning the themes and then developed sub-themes and topics that guided the call for abstracts. As a result, the congress was organized in seven (7) sub-themes, each with several topics as listed below:

A. Range/Grassland Ecology

- (i). Community composition and ecological drivers
- (ii). Savanna use and dynamics
- (iii). Global processes of woody encroachment in rangeland: status, drivers, and impacts
- (iv). Rangeland monitoring and support systems
- (v). Sustainable Land Use
- (vi). Participatory management, rangeland health
- (vii). Biodiversity Ecosystem Services
- (viii). Grazing, soil nutrient and properties
- (ix). Rangeland degradation and restoration
- (x). Eco-hydrology and plant responses
- (xi). Fire ecology, plant responses and management
- (xii). Commons: old, current and future challenges for rangeland what innovations in collective issues to face these challenges
- (xiii). Grazers - plant communities' interactions
- (xiv). Soil amendments and ecosystem productivity
- (xv). Modelling and management of ecological systems
- (xvi). Plant germplasm, recovery and biosecurity
- (xvii). Ecological trade-offs
- (xviii). Remote sensing, risk analysis and land management
- (xix). Ecological relationships

B. Forage Production and Utilization

- (i). Forage genetics & improvement
- (ii). Ruminant & forages -responses
- (iii). Temperate/Tropical Transition Climate Zones: Locations for Breeding Forages with Climate Resiliency
- (iv). Forage seeds systems genetic resources
- (v). Recent advances in *Urochloa* grass research in Kenya
- (vi). Forage traits for breeding
- (vii). Forage evaluation & agronomy
- (viii). Forages and nitrogen use
- (ix). Evaluation of Dual-Purpose Crops
- (x). Forage & fodder yields and conservation
- (xi). Forage and Animal Nutrition

- (xii). Forage Stress and Treatments for Improvement
- (xiii). Forage Modeling and Meta-analysis
- (xiv). Forage Exploration and Value chain
- (xv). Tropical Forages Genetic Resources
- (xvi). Forages and Environment Improvement
- (xvii). Forage planning and management
- (xviii). Forage management for productivity and nutrition
- (xix). Forage Quality and Anti-Nutritional Factors

C. Livestock Production Systems

- (i). Dairy Production Systems
- (ii). Integrated Crop-Livestock-Forestry Systems - the Brazilian experience
- (iii). Integrated Crop and Pasture-based Livestock Production Systems
- (iv). Sustainable management of grassland/rangeland ecosystems
- (v). Utilization of Grassland/Rangeland
- (vi). Small ruminant production systems
- (vii). Challenges on livestock production and rangeland/grassland utilization in southern South America
- (viii). Climate change; adaptations and resilience of Livestock systems
- (ix). Social-Economics of Livestock Production Systems
- (x). Beef Production Systems

D. Wildlife, Tourism and Multi-facets of Rangeland/Grassland

- (i). Ecosystem services and Ranching
- (ii). Biodiversity and Ecosystem Services
- (iii). Wildlife, agriculture and protected areas
- (iv). Forage legume ecosystem services in sustainable livestock systems

E. Drought Management and Climate Change in Rangeland/Grassland

- (i). Droughts and degradation - social-ecological perspectives on tipping points in dryland rangeland
- (ii). Land use, Carbon Sequestration and GHG fluxes
- (iii). Climate Change Impacts
- (iv). Early warning, monitoring and management of drought – a global perspective
- (v). Water Stress & Water Use Efficiency
- (vi). Remote Sensing Applications for rangeland management
- (vii). Mitigation, Adaptation & Resilience

F. Pastoralism, Social, Gender and Policy Issues

- (i). Local knowledge, local and global action
- (ii). Changes in rangeland property rights and land use in Central Asia and western China
- (iii). Gender and indigenous perspectives for sustainable rangeland: gendering and decolonizing pastoralist studies and rangeland conservation
- (iv). Investment, infrastructure and markets
- (v). Territory and policy and governance reform
- (vi). Action Plan for the International Year of Rangeland and Pastoralists - pt. 1
- (vii). Action Plan for the International Year of Rangeland and Pastoralists - pt. 2
- (viii). Action Plan for the International Year of Rangeland and Pastoralists (IYRP) - pt. 3
- (ix). Securing land tenure for pastoralists as an incentive for engaging actively in the UN Decade on Ecosystem Restoration
- (x). Dynamic change and evolving pastoralism

G. Capacity, Institutions and Innovations for Sustainable Development in Rangeland/Grassland

- (i). Accelerating the use of participatory action research for development in pastoral lands: challenges and opportunities
- (ii). Technological & Big Data Approaches to Decision-Support for Rangeland Management
- (iii). Communal and Collaborative Governance
- (iv). Management, Land Use Planning & Ecosystem Services
- (v). Participatory monitoring and silvopastoral systems
- (vi). Participatory socio-ecological observatories for sustainable rangeland development
- (vii). Re-envisioning rangeland in the 21st century: overcoming the marginalization narrative and social-ecological mismatches

Identification of Keynote Speakers

The committee identified keynote speakers for the thematic and sub thematic areas. There were two thematic keynote speakers for grassland and rangeland;

- The thematic *grassland area* was delivered by Dr. Liana Jank of Embrapa Beef Cattle Brazilian Enterprise for Agricultural Research.
- The thematic for *rangeland area* was delivered by Dr. Kathrine Johnsen – Norwegian Institute for Water Research (NIVA).

There was a keynote speaker for each of the seven sub-themes as detailed below:

1. *Rangeland and Grassland Ecology*: Prof. Brandon Bestelmeyer from the USDA-ARS Jornada Experimental Range.
2. *Forage Production and Utilization*: Dr. John Caradus, the Chief Executive, Grasslanz Technology Ltd.
3. *Livestock Production Systems*: Dr. Jimmy Smith, the Director General, International Livestock Research Institute.
4. *Wildlife, Tourism and Multi-facets of Rangeland/Grassland*: Dr. John Waithaka, the

Regional Vice Chair, East and Southern Africa World Commission on Protected Areas.

5. *Drought Management and Climate Change in Rangeland/Grassland*: Prof. Mark Howden - Director, Climate Change Institute, The Australian National University.
6. *Pastoralism, Social, Gender and Policy Issues*: Ms. Nahid Naghizadeh, the Centre for Sustainable Development and Environment (CENESTA), Tehran, Iran.
7. *Capacity, Institutions and Innovations for Sustainable Development in Rangeland/Grassland*: Dr. Jonathan Davies, Global Coordinator - Global Drylands Initiative IUCN Eastern and Southern Africa.

Development of Congress Sessions

Topics were developed into concurrent sessions, each composed of five papers, taking 15 minutes, followed by a 15 minutes discussion. Each concurrent session was 90 minutes long, which informed the development of the congress program.

Initially, 405 oral presentations were planned for in-person congress, which were to be presented in 81 concurrent sessions. However, due to the global COVID-19 pandemic and associated health protocols, the in-person congress was converted to a virtual congress. The virtual congress had to consider all the time zones, and sessions had to start and end at the most convenient time to accommodate all the delegates. Due to the foregoing, the time available could only allow for 237 oral presentations in 59 concurrent sessions. Figure 1 is a schematic representation of the Congress programme showing rooms' layout to accommodate all the concurrent sessions. The entire program is attached as ANNEX 9.

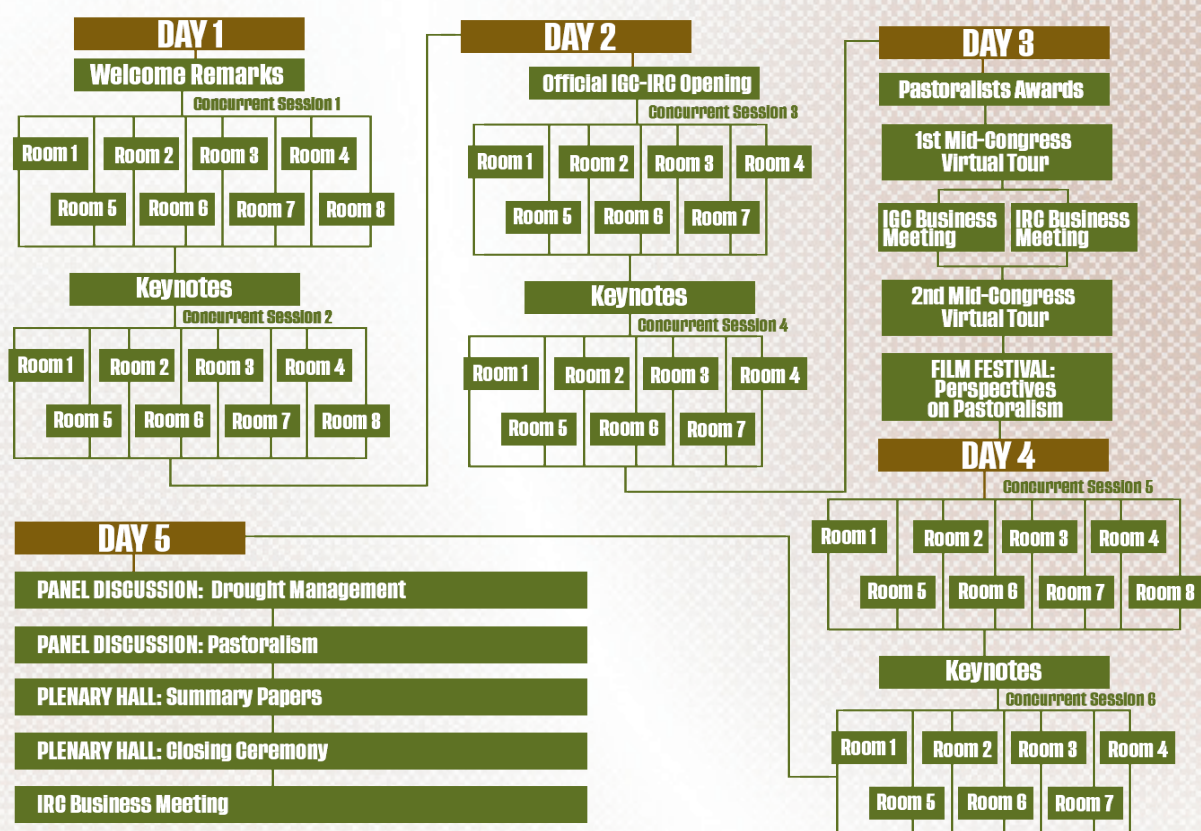


Figure 1. Schematic representation for the Joint IGC-IRC congress Program

Management of the Sessions

- *Opening Ceremony:* This was addressed by the Chair of the IGC continuing committee, the President of the continuing committee of the IRC, the Director-General KALRO and Principal Secretary State Department for Livestock. The congress was officially opened on the second day by the Cabinet Secretary in the MALF&C represented by the Chief Administrative Secretary (CAS). A total of 304 delegates attended this session.
- *Plenary sessions:* comprised the opening session (2 hours), all keynote addresses (for each keynote address 30min), panel discussions (90 minutes each), business meetings (90 minutes each), two summary papers session on rangeland and grassland (20min each) and closing ceremony (80 minutes). The summary of participation is presented in the detailed tables below.
- *Concurrent sessions* consisted of 5 papers with 90 minutes, including discussions. The summary of participation in the concurrent sessions is presented in the detailed tables below.
- *Poster sessions:* A total of 219 poster papers were mounted for the five-day congress period, and two days were dedicated to manned posters on Tuesday and Thursday, for 90 minutes each day. The summary of participation in the poster sessions is presented in the detailed tables below.
- *Panel discussions:* There were two-panel discussions which had the following panelists;
Drought management (facilitated and moderated by IGAD): Chris Funk - Climate Change outlook and Its Impacts on Rangeland/Grassland; Beverley Henry - Carbon Sequestration and GHG fluxes in Grassland/Rangeland; Pierre Gerber - Degradation in Rangeland/Grassland and impact on livestock production; and John Patrick Kabayo - Drought and climate change Resilience in Rangeland/Grassland.
Pastoralism (facilitated and moderated by IUCN): Jonathan Davies - The role of pastoralists' knowledge and institutions in rangeland management; Saverio Krätli - The role of pastoral mobility in valuing variability; Pius Loupa - Governance for sustainable pastoralism that creates value out of variability; Hussein Wario - Resource mobilization for research in sustainable pastoralism; and Barron Orr - Land degradation neutrality and sustainable rangeland management.
- *Business Meetings (IRC/IGC):* The business meetings for the International Grassland and Rangeland Congress were held on the last day of the congress concurrently.
- *Closing ceremony:* The ceremony took 80 minutes with speeches from Presidents of IRC and IGC (which also included an announcement for the next Congresses) and Kenya Government officials.
- Congress opening ceremony speech and closing ceremony remarks are presented from ANNEX 1- 4.

Attendance of the Congress

A total of 675 delegates from 66 countries attended the congress. With 246 delegates, Africa had the highest attendance, followed by Europe and North America and Canada with 84 and 78 delegates each. The distribution of the delegates is presented in Figure 2, Table 3 and Table 4. There were few delegates from the traditional areas like China, Australia and New Zealand.

This could have been caused by several factors, including time of the day the congress was running and restrictions on Voice-over-Internet protocol (VoIP) in some countries. The congress was running from 13:00 – 18:00 hours East African Time which would have been 21:00 – 04:00 hours in Western Australia and thereby limiting potential participants to join.

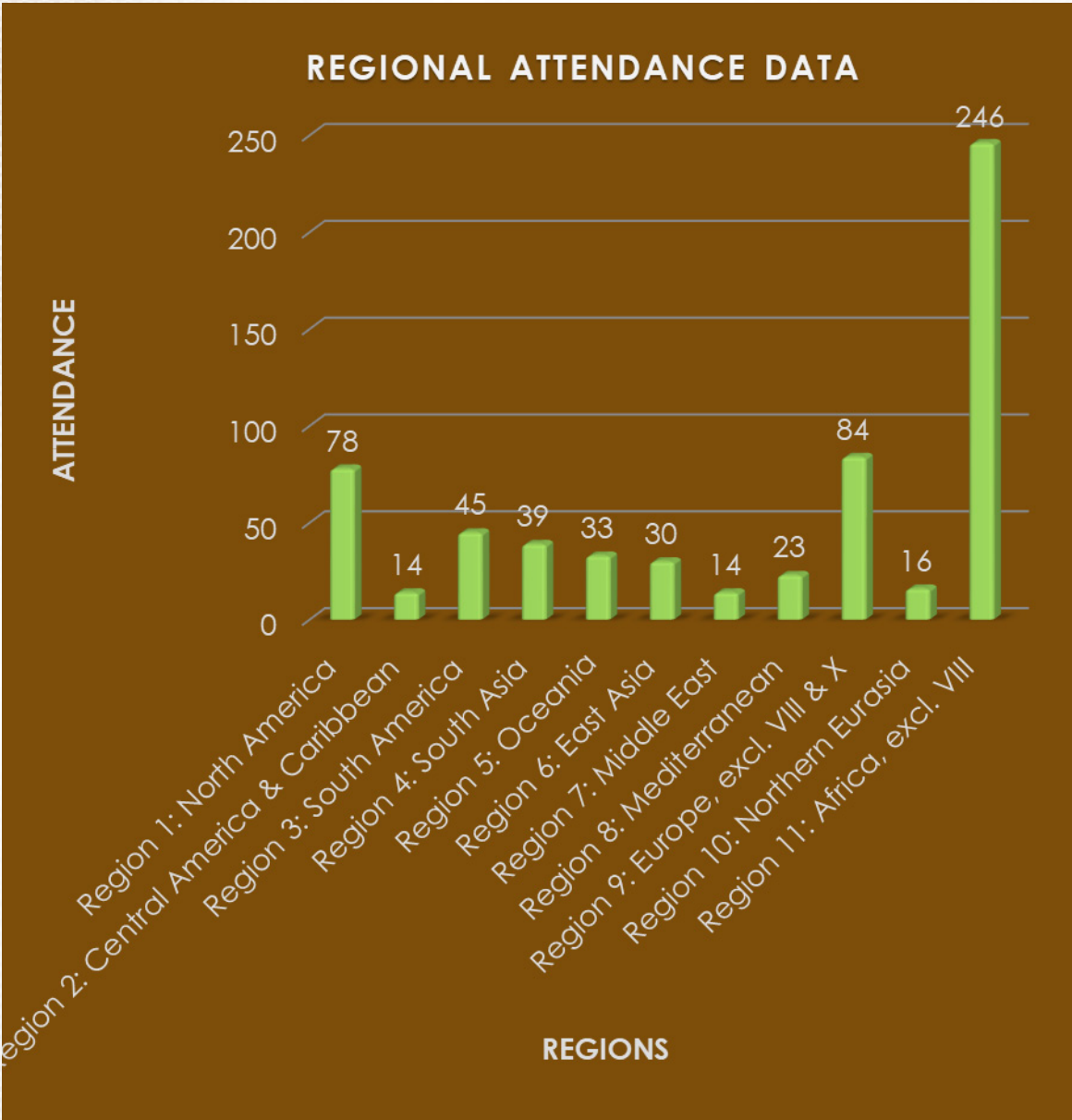


Figure 2: Distribution of Delegates attending the Joint IGC-IRC Kenya 2021

Table 3: Attendance in Concurrent Sessions 1 and 2

Room/Topic	Total Joined
PLENARY HALL: Welcome Remarks	602
Concurrent Session 1	
Room 1: Range/ Grassland Ecology	287
Room 2: Forage Production and Utilization	507
Room 3: Forage Production and Utilization	318
Room 4: Livestock Production Systems	287
Room 5: Wildlife, Tourism and Multi-Facets of Rangeland/Grassland	180
Room 6: Drought Management and Climate Change in Rangeland/Grassland	208
Room 7: Pastoralism, Social, Gender and Policy Issues	230
Room 8: Capacity, Institutions and Innovations for Sustainable Development in Rangeland/Grassland	359
PLENARY HALL: Opening Session & Keynotes	980
Concurrent Session 2	
Room 1: Range/Grassland Ecology	225
Room 2: Range/ Grassland Ecology	196
Room 3: Forage Production and Utilization	139
Room 4: Livestock Production Systems	240
Room 5: Forage Production & Utilization	254
Room 6: Pastoralism, Social, Gender and Policy Issues.	240
Room 7: Capacity, Institution and Innovations for sustainable Development in Rangeland/Grassland	348

Table 4: Attendance of Concurrent Sessions 3 and 4

Room/Event	Total Joined
OFFICIAL IGC-IRC OPENING SESSION	199
Concurrent Session 3	
Room 1: Range/ Grassland Ecology	246
Room 2: Forage Production & Utilization	223
Room 3: Forage Production and Utilization	197
Room 4: Livestock Production Systems	287
Room 5: Drought Management and Climate Change in Range-land/Grassland	233
Room 6: International Year of Rangeland and Pastoralists, Pt1	244
Room 7: Pastoralism, Social, Gender and Policy Issues	139
PLENARY HALL: Keynotes	555
Concurrent Session 4	
Room 1: Range/Grassland Ecology	113
Room 2: Range/Grassland Ecology	286
Room 3: Forage Production and Utilization	240
Room 4: Livestock Production Systems	78
Room 5: Pastoralism, Social, Gender and Policy Issues	141
Room 6: International Year of Rangeland and Pastoralists, Pt2	281
Room 7: Capacity, Institutions and Innovations for Sustainable Development In Rangeland/Grassland	101

Successes from the Program Sub-Committee perspective

- (a) Overall, the programme for the five days ran with no major hitches, and the platform employed was able to handle all the concurrent sessions and a large number of LOGINS. The pre-recorded presentations were played where the speaker could not log in for one reason or the other. The presentations by Keynote speakers were very well received and generated a lot of discussions afterwards.
- (b) The opportunity was provided for all those chairing sessions to be trained on maneuvering within the programme. In addition, the virtual platform personnel organized a one-hour familiarisation session for the chairpersons, each day before the sessions started. However, not all substantive chairpersons could join and some had difficulties navigating around the virtual platform. As a result, a strategy to use the National Organizing Committee members as backup was mooted and turned out to be very beneficial and timely as they took over when the substantive chairs failed to join on time or had difficulties handling the platform.

Lessons learnt from the Program Sub-Committee perspective

- (a) Training of Chairs and Presenters is critical for a successful virtual congress. Provision of backroom for preparations of Chairs and session presenters was helpful and very important.

- (b) The TORs in the congress guidelines for program and publications sub-committees should be fine-tuned to avoid overlaps and enhance the smooth implementation of the congress program.
- (c) Key topics like “Political instability and extremism: its impact on rangeland and grassland management”, did not attract any paper. It is recommended that in future the organizing committee should proactively solicit the papers under such topics.
- (d) Information from concurrent sessions, panel discussions and posters should always be captured and packaged for general discussions.
- (e) Good internet connectivity is critical for the smooth implementation of a virtual congress.
- (f) Virtual tours were an excellent tool to showcase Kenya’s grassland and rangeland and her rich wildlife heritage. However, they need to be planned better and should capture key issues along the tour route, including land-use change.

2.2 Publications Sub-Committee

The sub-committee addressed the following TORs in making its contribution to the success of the Congress:

- (i). Identification and co-opting international members with experience for the committee in organizing a Congress of that level.
- (ii). Identification and sourcing for the web-based platform for paper submission
- (iii). Developing guidelines for preparation and submission of abstracts.
- (iv). Sending out a call for abstracts
- (v). Recruiting reviewers of diverse expertise
- (vi). Managing abstract peer-review process
- (vii). Sending out call for full papers
- (viii). Developing formats and templates for paper (3-4 page) submission
- (ix). Preparing instructions/guidelines/criteria for paper (3-4 page) reviews
- (x). Managing paper (3-4 page) peer-review process
- (xi). In collaboration with the Program sub-committee group accept papers into sub-themes
- (xii). In collaboration with the Program sub-committee group accept papers into sessions
- (xiii). Developing guidelines for the virtual oral and poster presentations
- (xiv). Finalizing the congress proceedings

Membership of the committee

The committee had 16 members drawn from different organizations. The chairperson was Dr Lance Robinson of the International Livestock Research Institute (ILRI) and Prof Moses Nyangito from the University of Nairobi. The secretary was Dr. Jane Wamuongo assisted by Ms. Primrose Nabwire, from the Kenya Agricultural and Livestock Research Organization. The list of members is presented in Table 5 below:

Table 5: Membership of the Publications Sub-committee

S No.	Name	Affiliation	Email address
1	Dr Lance Robinson	ILRI	l.robinson@cgiar.org L.Robinson@ru-waza.com
2	Dr Andrew Mude	ILRI	a.mude@cgiar.org
3	Prof Moses Nyangito	UoN	nyangito@uonbi.ac.ke
4	Dr Francesco Fava	ILRI/UniMi	f.fava@cgiar.org / francesco.fava@uni-mi.it
5	Dr Jane Wamuongo	KALRO	Jane.Wamuongo@kalro.org
6	Ms. Primrose Nabwire	KALRO	Primrose.wanyama@kalro.org
7	Dr Dereje Wakjira	IGAD	dereje.wakjira@igad.int
8	Dr Samuel Mbuku	A P S K / KALRO	Samuel.Mbuku@kalro.org
9	Dr Joyce Maina	APSK/UoN	maina.joyce78@gmail.com
10	Dr Jonathan Davis	IUCN	Jonathan.Davies@iucn.org
11	Dr Solomon Mwendia	ICRISAT	S.Mwendia@cgiar.org

12	Dr Njoki Kahi	ILRI	Njoki.Kahi@cigar.org
13	Prof David Kemp	CSU	dkemp@csu.edu.au
14	Dr Gabriel Esteba Oliva	INTA	oliva.gabriel@inta.gob.ar
15	Mr. Doug Johnson		d-kjohnson@comcast.net
16	Prof David Michalk	CSU	dm.hainan@gmail.com

Successes from the Publications Sub-Committee perspective

- (a) The sub-committee, working with the procurement office under the local arrangements sub-committee sourced and identified Dryfta, a web-based platform for the Congress. Dryfta was hired, installed and operationalized by the committee. Through this platform the committee received 1,040 abstracts that were intended for the physical congress. These abstracts and papers were processed through a thorough peer review process culminating in 405 oral presentations and 635 poster presentations.
- (b) Dryfta platform did not only help in processing the papers, but also allowed participants from countries with internet restrictions to access congress information from the main congress website when the Congress switched to fully virtual. The committee acknowledges the superb work done by the local and international reviewers that gave the congress quality paper and poster presentations.
- (c) The oral presentations were analyzed and grouped into appropriate sub-themes and sessions, out of which some were recommended to be part of the concurrent sessions. Concurrent sessions were a group of papers proposed by a group of scientists to address a specific issue in the grassland/rangeland. This approach of presentation of papers in sub-themes and concurrent sessions enhanced the focus on the multifaceted issues affecting grassland and rangeland.
- (d) The in-person congress was planned for October 2020, however, due to the COVID 19 pandemic it was postponed to October 2021. Later the congress was to be held virtually and the sub-committee managed this change by developing guidelines and formats for virtual submission and presentations of orals and posters.
- (e) The strategy of the sub-committee of allowing oral presentations to be pre-recorded allowed for seamless presentations during the congress where presenters were not able to log in.

Lessons learnt from the Publications Sub-Committee perspective

- (a) From the review process, there is a need to strive to identify a critical mass of dedicated and committed reviewers to support such an international congress.
- (b) Pre-recording of presentations proved very useful, especially where authors could not log in for various reasons. That should be adopted as a means of backstopping in future congresses, whether virtual or in-person.

2.3 Tours Sub-Committee

The Tours Sub-Committee was charged with organizing and planning pre-congress and mid congress tours. The objectives of the tours were to promote the interchange of scientific and technical information on all aspects of grassland and rangeland, including research, planning, development, utilization, reclamation, management, extension, education and training. The terms of reference for the subcommittee were:

- (i). Design tour routes for both pre-congress and mid congress tours
- (ii). Identify hotels that would host delegates during the tours
- (iii). Call for proposals with specific entities/companies (affiliated or registered with the Kenya Tourism Board) to provide services during the pre and mid congress tours
- (iv). Coordinate with/monitor the said entities for smooth flow of transport logistics for pre- and mid-congress route management
- (v). Work hosting persons/institutions to ensure they were ready to receive visitors

Membership of the sub-committee

The members of the sub-committee were drawn from various organizations as shown in Table 6:

Table 6: Membership of the Tours Sub-committee

	Name	Affiliation	Email address
1	Dr. David Miano Mwangi	KALRO	davidmianomwangi@gmail.com
2	Dr. George Keya	KALRO	Georgekeya7@gmail.com
3	Dr. Michael Okoti	KALRO	Michael.okoti@kalro.org
4	Dr. Oliver Wasonga	UoN	oliverwasonga@gmail.com
5	Dr. Stalin Kibet	UoN	Kibet3k@gmail.com
6	Mr. Benjamin Ndegwa	SDL	Ndegwaben2005@yahoo.com
7	Mr. Blaise Okinyi	SDL	okinyiblaise@gmail.com
8	Dr. Patrick Watete	SDL	pwatete@gmail.com
9	Mr. Maurice Ouma	SDL	onyiouma@gmail.com
10	Mr. Pancras Ngati	SDL	ptngati@yahoo.com
11	Mr. Peter Njoroge	SDL	Njorogepetern69@gmail.com
12	Ms. Primrose Nabwire	KALRO	Primrose.Wanyama@kalro.org

Virtual tours

Due to the change from in-person to a virtual congress, the sub-committee had to change to virtual tours. After consultations with the NOC, the committee showcased seven virtual tours from partners on work done within the rangeland and grassland of Kenya. The tours showcased are summarised below: -

Tour 1: Pasture breeding and production for enhanced livestock production and rangeland rehabilitation

This tour highlighted the Kenyan southern rangeland and covered changes from ranching to crop farming and urban development. The key challenge of the rangeland was degradation leading to scarcity of pasture. Scientists from KALRO's Arid and Rangeland Research Institute at Kiboko showcased the research that was being done on pasture breeding and fodder germplasm screening and how the research linked with farmers. A model farmer was showcased with his experience in informal pasture seed systems, commercial pasture seed and hay bulking.

Tour 2: East Africa's Drylands: Big Lands, Big Opportunities

This virtual trip was to the great savanna lands of East Africa,—the cradle of humankind, home to traditional nomadic pastoralists and harbours of some of the most spectacular wildlife populations on earth. The delegates learned about the productivity and resilience of these mostly under-appreciated and often ignored landscapes. The tour also described the delicate balance we need to strike to conserve these rangeland landscapes. The link between pastoralists and their role in supplying animal protein was clearly shown. This role is contextualised within various landscapes that have not received adequate attention and funding compared to other areas, despite their essential functions in preserving biodiversity, sequestering carbon and supporting the livelihoods of millions. This tour bursts the prevailing myths around rangeland and pastoralism and addressed the impacts of climate change.

Tour 3: National Parks of Kenya virtual Tour

The delegates were taken through most of the national which are endowed with many natural resources and wildlife across the country. This rich heritage is vital in economic development and has greater ecosystem regulatory functions. The management structures of the national parks were also discussed during the tours.

Tour 4: IGAD Protocol on Pastoral transhumance

This was a video presentation of the IGAD Protocol on Transhumance that was concluded in 2018. The protocol aims to enhance the free movement of pastoralists living at the border areas of the IGAD member countries searching for pasture and water for their livestock, especially during periods of drought. In the presentation, it is stated that the protocol is expected to enhance the security of pastoralists and their host communities. Consequently, the protocol will prevent the loss of livestock due to the perennial droughts experienced by pastoralists in the IGAD region.

Tour 5: Management and carbon credits in Kenya

This was a video presentation of the Northern Kenya Rangeland Carbon Project that has been touted as the world's first large-scale grassland soil carbon project. Some of the highlights of the presentation were that the project was one of few large, landscape-level carbon removal

ventures currently on the market. It is anticipated to remove and store 50 million tons of CO₂ over 30 years – the equivalent of the annual emissions from over 10,000,000 cars. The sale of this sequestered carbon from community rangeland in northern Kenya created additional and much-needed income. The conservation efforts focused on improving habitat for four endemic endangered species - the Eastern black rhino, Grevy's zebra, Reticulated giraffe and Beisa oryx, and addressed impacts of climate change. The project spanned 1.9 million hectares (4.7 million acres) and it was an initiative to improve grazing for pastoralists and generate additional revenue for 14 community conservancies, increasing the financial viability of conservation and making community conservancies more resilient.

Tour 5: From cows to camels

This virtual tour showcased how herders in Isiolo County, in Kenya's drylands, were grappling with shrinking pasture and the impacts of a changing climate. The presenters explained that the Kenyan range landscape was changing from grassland to a shrub land, necessitating a shift from predominant grazers to browsers, especially from cows to camels. Camels cope better than cattle in times of drought. The traditional land management system of the Boran pastoralists, known as Dedha, was presented as another way to cope with the harsh climate. Pastoralists presented their views following a peer-to-peer learning exchange to equip the herders with camel-rearing and pasture management skills that was facilitated by researchers with the Adaptation at Scale in Semi-Arid Regions initiative.

Tour 6: The ILRI Virtual Tour

This virtual tour showcased ILRI research in livestock, rangeland and grassland, and its facilities. The ILRI Director-General did the narration.

The mid Congress Tours was split into 1st Mid Congress Tour & 2nd Mid Congress tours where 4 tours and 3 tours were played respectively.

- 1st Mid Congress Tours: 147 unique LIVE viewers
- 2nd Mid Congress Tours: 108 unique LIVE viewers

Lessons learnt from the Tours Sub-Committee perspective

- (a) There was need to involve the media professionals from the initial planning stage to develop virtual tours to tap into their technical advice and guidance.
- (b) The committee needed more time to deliver quality output.
- (c) Use of partners' videos to show case grassland and rangeland management and utilization saved the day. In future such materials should be reviewed to showcase successes in the sustainable utilization of grassland and rangeland.

2.4 Publicity Sub-Committee

The overall objective of the publicity committee was to publicize the Joint IGC–IRC 2021 Congress. The specific terms of reference of the committee were;

- (i). Conceptualize and design the Congress logo and website
- (ii). Publicize the event on various platforms for financial support.
- (iii). Develop and send out the various announcements, and call for abstracts and papers
- (iv). Submit press releases to various local and international media houses.
- (v). Organize a media breakfast meeting for stakeholders and relevant media houses
- (vi). Engage bloggers to publicize the congress on various online platforms, i.e. Facebook, Blogs and tweeter;
- (vii). Support the various committees in publicizing information relevant to the congress
- (viii). Organize a congress promotional display booth or information at scientific conferences
- (ix). Document the event in terms of photography and videography during the conference

Membership of the committee

The members were drawn from various organizations, as detailed in Table 7 below:

Table 7: Membership of the Publicity Sub-committee

No	Name	Affiliation	Email address
1.	Mr. Dennis Onkundi	MoALFC	drdennisonkundi@gmail.com
2.	Mr. Francesco Fava	ILRI	F.Fava@cgiar.org
3.	Mr. Pius Cheruiyot	MoALFI	pcheruiyot@kilimo.go.ke
4.	Mr. Richard Kedemi	KALRO	Richard.kedemi@kalro.org
5.	Mr. Henry Wanyama	KALRO	Henry.wanyama@kalro.org
6.	Mr. Stephen Odipo	KALRO	Stephen.odipo@kalro.org
7.	Ms. Beryl Agengo	Events consultant	winnieberyl@gmail.com
8.	Ms. Primrose Nabwire	KALRO	nabwireprose@gmail.com
9.	Ms. Hellen Omukoko	Kenya Tourist Board	helen@ktb.go.ke
10.	Ms. Patricia Onyango	CIAT	P.Onyango@cgiar.org
11.	Dr. Elkana Nyambati	KALRO	Elkana.nyambati@kalro.org
12.	Ms. Virginia Wangari	KALRO	Virginia.ndungu@kalro.org
13.	Ms. Florida Maritim	KALRO	Florida.martimi@kalro.org

Implementation of the Publicity Issues

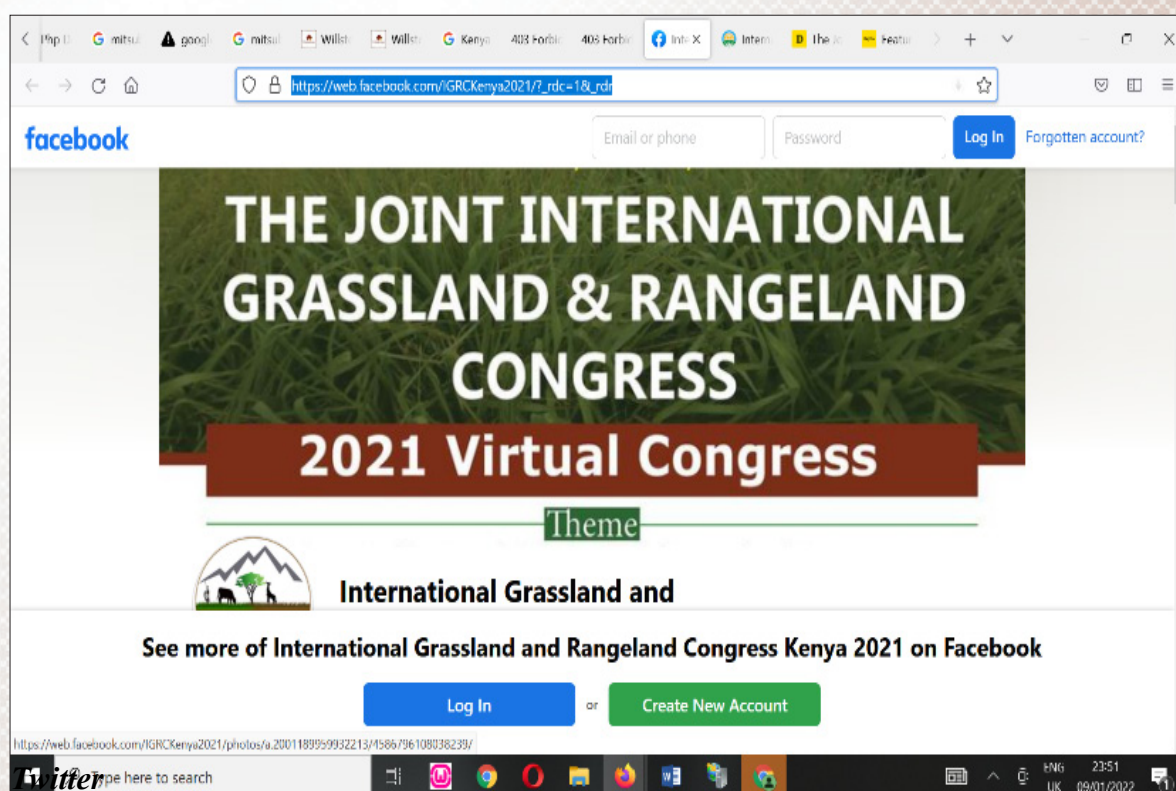
Social Media Platform

The publicity committee created an online social presence for the congress through;

- (i). Drafting and developing infographics to accompany the relevant announcements.
- (ii). Developing short video clips for online media
- (iii). Regularly updating event social media platforms and managing congress social media platforms
- (iv). Posting and promoting “announcements” on social media pages

Facebook

A Facebook page was created https://web.facebook.com/IGRCKenya2021/?_rdc=1&_rdr



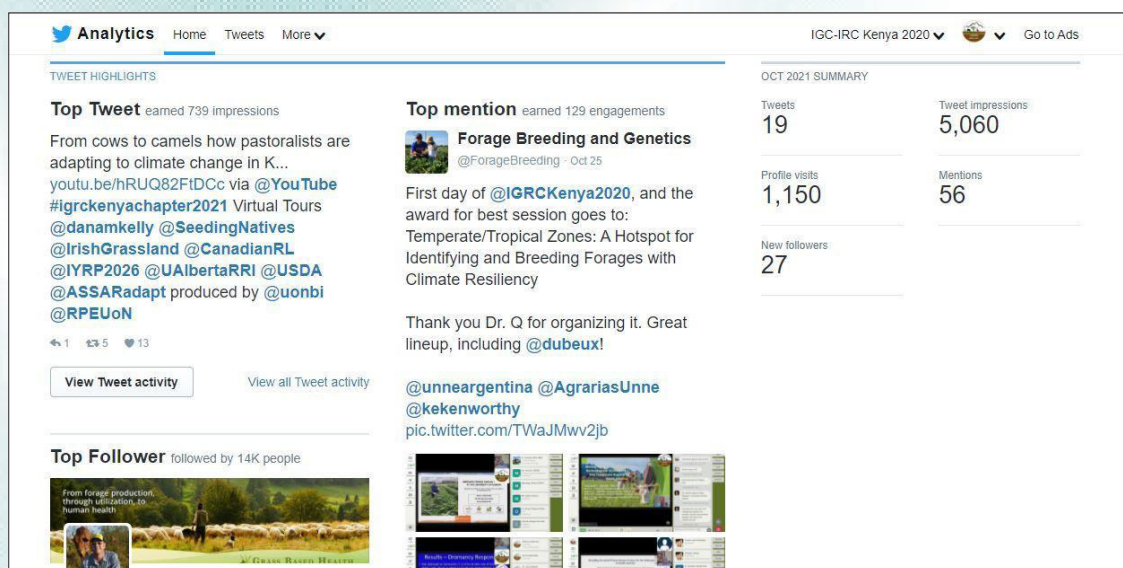
A Tweet page was created <https://twitter.com/IGC-IRC%20Kenya%2021>

Sample info graphics on social media platforms

Promotional Materials

Promotional materials created and shared via emails and websites included:

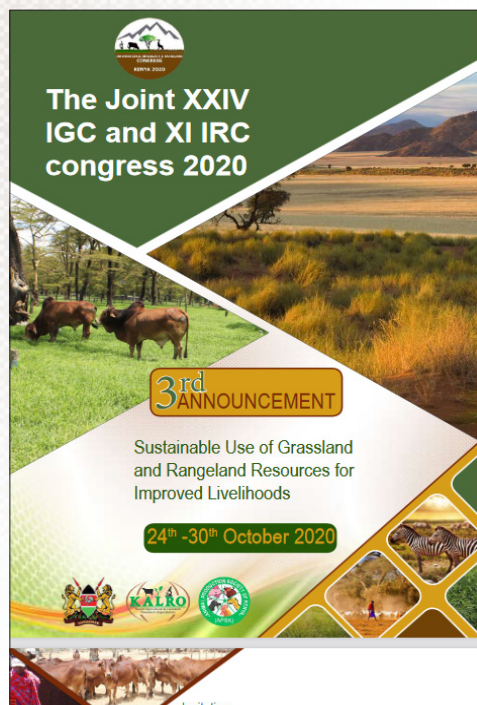
- (i). Leaflets and posters for registration and call for papers



- (ii). Brochures about the congress
- (iii). Fliers for saving the date
- (iv). Banners including roll up banner and media banner for media interviews and partner logo promotion
- (v). Booklets: 1st – 3rd announcement and prospectus booklets
- (vi). Short video clips
- (vii). The 15 slide congress PowerPoint presentation about the event, venue and date; About Kenya; Pre and Mid tours; Critical dates; Logos of partners; Pictorials of various tourist attraction sites
- (viii). Logo and Website
- (ix). Promotional collaterals such as T-Shirts, bags, hats, pens and note books
- (x). Develop speeches and talking notes used by key speakers pre, during and after congress.
- (xi). Develop Congress magazine

Examples of the promotional materials used

Media Engagement



The sub-committee created media presence of the congress to enhance its publicity both locally and internationally by accomplishing the following;

- (i) organized a media breakfast event attended by 25 journalists from different media houses
- (ii) developed press release about the Congress and shared with various media houses

- (iii) Engaged 20 bloggers to publicize the event online.
- (iv) Aired related stories on TV to enhance publicity of the congress. These are provided in the following links: (<https://youtu.be/DEI5P0SUGKc>, <https://youtu.be/SguZZisTPr8>, https://youtu.be/23_mOIA2t88)
- (v) developed a 2-page newspaper pull-out on the Standard Newspaper, which is one of the Kenyan dailies.
- (vi) placed an advert on the front page of the Standard Newspaper
- (vii) arranged for live coverage of the opening and closing ceremonies on KTN TV, which can be found on Youtube at <https://youtu.be/dFo6Zv33TVQ>
- (viii) Invited and managed the media coverage during the event; six local media houses were engaged, which included, Citizen TV, Radio Maisha, Star Newspaper, Pwani radio, KBC TV and Daily Nation.

Pictorial Coverage

The publicity committee documented the event using photography. Below are snip photos during the Joint congress held in Nairobi, Kenya in October 25 – 30, 2021.

Congress Website



The congress website was <http://2021kenya-igc-irc.rangelandcongress.org> and had received 439,287 visitors since 2018. The main sections of the website were; About Congress, Thematic Areas, Program Overview (Programme, Keynote Speakers), Congress Information (Documents, Photos/ Videos, Committees and useful links, Exhibitions, Sponsorship and Registration.

Congress Website Screenshot



Lessons learnt from the Publicity Sub-Committee perspective

- (a) Employing good and effective robust ICT platforms such as Dryfta and creating an interactive website was key to hosting a successful virtual Congress.
- (b) Engaging the media houses throughout the event period was necessary for adequate publicity.
- (c) Some scientists participating in the congress did not engage on social media tools such as Twitter and Facebook and in future they should be encouraged to do so.
- (d) Plans should always be made in advance on how to migrate information/data bases in the contracted online systems to local systems after the event for future reference.

2.5 Local Arrangements Sub-Committee

The local arrangement committee played a supportive role to all the other sub-committees. The sub-committee was responsible for all logistical arrangements, including visas, air travel and local transport, accommodation of delegates and procuring the congress venue. The sub-committee terms of reference were:

- (i) Identify hotels and make contractual arrangements on booking links
- (ii) Keep a record on delegates' accommodation, countercheck on delegates pick up from the airport
- (iii) Work with NOC secretariat to establish a list of confirmed participants
- (iv) Establish contact with Immigration to ensure seamless issuance of visas to delegates
- (v) Organize reliable local transport from agreed bus companies and coordinate transport arrangements to and from the KICC during the congress.
- (vi) Ensure high standards of cleanliness and venue maintenance for the event, ensure all audio-visual, lighting and screen projections are correctly set up.
- (vii) Coordinate overall event management system and security during the congress

The committee spent a lot of time on these arrangements. However, changing from an in-person to a virtual congress reduced responsibilities to hosting the virtual congress platform and planning for virtual exhibitions.

Membership of the committee

The sub-committee had seven members as listed below (Table 8).

Table 8: Membership of the Local Arrangements Sub-committee

	Name	Institution	Email address
1	Mr. Simon H. Onchiri	Immigration	sonchirish@gmail.com
2	Prof. Cecilia M. Onyango	UoN	cecilia.onyango@uonbi.ac.ke
3	Dr. Elkana Nyambati	KALRO	elkana.nyambati@kalro.org
4	Ms Molly Wambui	KEPROBA	MWambui@brand.ke
5	Ms. Primrose Nabwire	KALRO	nabwireprose@gmail.com
6	Mr. Moses Boit	KALRO	moses.boit@kalro.org
7	Ms. Hellen Omukoko	KTB	helen@ktb.go.ke
8	Ms. Florida Maritim	KALRO	florida.maritim@kalro.org

Table 9: Number of visits to the various Congress Exhibition Booths

	Booth exhibitor	Total Logins
1	Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MALF&C)	226
2	Welcome Kenya	224
3	KALRO	203
4	International Year of Rangeland and Pastoralists (IYRP)	122
5	Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) GASL	115
6	USDA- Agricultural Research Service (USDA-ARS)	83
7	International Grassland Congress (IGC) 2023	74
8	University of Nairobi - Department of Land Resources Management and Agricultural Technology	58
9	Coalition of European Lobbies for Eastern African Pastoralism (CE-LEP)	49
10	Animal Production Society of Kenya (APSK)	47
11	Kenya Seed Company (KSC)	31
12	Climate Smart Pastoralists Limited (CSPL)	30
13	African Union-Inter African Bureau for Animal Resources (AU-IBAR)	26
14	The Intergovernmental Authority on Development (IGAD)	24
15	Conservation South Africa	20
16	Society of Range Management (SRM)	12
	Total	1344

Successes from the Local Arrangements Sub-Committee perspective

- (a) The Sub-Committee working closely with Protel Studios Limited (a local technology service provider), demonstrated that Kenya can host international virtual congresses. This was assessed by the number of people who attended the congress online (675), visits to exhibition booths (1344), excellent online discussions and the number of people following the congress on Youtube (see Table 9 above).
- (b) A total of 16 virtual booths were developed and were visited by a total of 1,344. A sample of a virtual booth is shown in Figure 3. The following booths were the most popular; MALF&C, Welcome to Kenya and KALRO. The details of the booths and the number of visits is given in Table 9 above.



- (c) The interaction among the delegates was good on the virtual platform through the Q&A sessions and chatbox, and the exhibitors got wide visibility.

Figure 3: A virtual booth on ‘Welcome Kenya, to promote the country as a conference and tourist destination

Lessons Learnt from the Local Arrangements Sub-Committee perspective

- (a) The decision to have a virtual congress should be made in good time to ensure that all facilities required to support the virtual platform are put in place to ensure a seamless process.
- (b) The deadline for submission of virtual exhibitions should be done at least two months before the congress dates to allow for uploading and training of the exhibitors on the use of the virtual platform
- (c) It is important to have organizers manage a virtual congress from a central point.
- (d) The venue for the management of the virtual congress should allow the management of concurrent sessions from different rooms by the organizing committees for effective management.
- (e) It is recommend that future Congresses be held either as a hybrid or fully physical to

enable wider participation and interactions among participants.

2.6 Finance and Fundraising Sub-Committee

The finance and fundraising sub-committee was responsible for sourcing and managing the finances required to support the hosting of the congress. The specific terms of reference for the committee were to;

- (i) Coordinate preparation and consolidation of Congress budget
- (ii) Coordinate fundraising activities from local and international sponsors
- (iii) Open and operating Congress bank account(s)
- (iv) Facilitate sponsorship of delegates and speakers
- (v) Coordinate preparation of contracts
- (vi) Approve sub-committee budgets and payments
- (vii) Maintain financial records
- (viii) Prepare financial reports and reconciliation of accounts

Funds for the congress were mainly provided by the Government of Kenya, local and international sponsors, and delegates' registration.

Membership of the committee

Membership of the sub-committee is as shown in Table 10

Table 10: Membership of the Financial and Fundraising Sub-committee

S. No	Name	Affiliation	Email address
1	Mr. Patrick Ngicuru	SDL	patrickngicuru@yahoo.com
2	Mr. Stanley Humaiya	SDL	humaiyalvsk2000@yahoo.com
3	Dr. Festus Murithi	KALRO	Festus.Murithi@kalro.org
4	Dr. George Keya	KALRO	George.Keya@kalro.org
5	Dr. Alice Murage	KALRO	Alice.Murage@kalro.org
6	Mr. David Muriithi	KALRO	David.Muriithi@kalro.org
7	Dr. Iain Wright	ILRI	i.wright@cgiar.org
8	Dr. Samuel Mbuku	APSK/ KALRO	Samuel.Mbuku@kalro.org
9	Dr. Dereje Wakjira	IGAD	dereje.wakjira@igad.int
10	Ms. Primrose Wanyama	KALRO	Primrose.Wanyama@kalro.org
11	Mr. Stanley Mwaura	SDL	Mwaura.stanley74@gmail.com

Implementation of the Sub-Committee activities

The committee undertook the following activities;

- (i). Prepared sponsorship prospectus covering background information about Congress, levels of sponsorship and accruing benefits, registration and registration fees, tours and tours fees, exhibitors and exhibition fees, etc.

- (ii). Identified potential local and international sponsors: Tracker developed and individuals allocated to have conversations and follow-ups with potential sponsors.
- (iii). Sent letters to potential sponsors and made follow-ups
- (iv). Consolidated budgets of various committees into one congress budgets
- (v). Approved budgets from various sub-committees
- (vi). Processed payments for various activities done by sub-committees
- (vii). Prepared and presented to NOC the progress reports.
- (viii). Followed up remittance of financial pledges of funds to support the Congress from the GoK and other sponsors.
- (ix). Coordinated the service provider (iPay) for the online payments
- (x). Participated in the process of evaluation and awards of contracts to various service providers
- (xi). Monitored cash flows in the bank accounts
- (xii). Prepared financial reports and reconciliation

After a decision was made that Congress would be held virtually due to the COVID-19 pandemic, the sponsorship prospectus was reviewed to accommodate the change. Some of the changes made included:

- (i) Sponsor's logo to be placed on the Congress website
- (ii) Sponsor's Logo should be screened during the breaks and Congress and should scroll on the virtual platform.
- (iii) The revised benefits accruing to the sponsors are detailed in Table 11 below:

Table 11: The revised benefits accruing to the Sponsors

ACCRUING BENEFITS	CATEGORY AND LEVEL OF SPONSORSHIP			
	GOLD	SILVER	BRONZE	SUPPORTER
	Over \$ 30,000	\$ 20,000 - 29,999	\$ 10,000 - 19,999	Under \$10,000 cash, in-kind support
Opportunity for Pre-Congress Workshop	√			
Complementary Registrations	20	15	10	5 (if >\$5000)
Exhibition Booth	√	√	√	

Logo on Website	√	√	√	
Links to your Logo	√	√	√	
Video Clip	√	√	√	

Income and Expenditure analysis

The NOC opened and operated two bank accounts at the National Bank of Kenya, Westlands Branch. A Kenya Shilling account received funds and transacted business in KES for local currency transactions, and a US Dollar Account, which transacted business in USD for international transactions. Below is an analysis of the income and expenditure reports for the two accounts as of 17th January 2022.

Kenya Shilling Account

The income received through this account was KES 106,175,991.00 (USD 935,471.29). The total expenditure incurred through the account was KES 38,785,084.25 (USD 341,718.80). Table 12 gives the details of the income and expenditure for the KES account.

Table 12: Income and Expenditure from the KES Account

Income Received	Amount (KES)	Amount (USD) I USD= KES 113.5
Government of Kenya (GoK)	105,875,991.00	932,828.11
Kenya Seed company	300,000.00	2,643.17
Total income	106,175,991.00	935,471.29
Expenses so far incurred	Amount (KES)	Amount (USD)
Daily Subsistence Allowance (DSA) & local travel	14,736,173.90	129,834.13
Contracted services	9,483,234.00	83,552.72
International travel (Range management meeting in Denver Colorado USA)	4,907,296.35	43,236.09
Conference facilities	4,484,915.00	39,514.67
VAT	201,647.00	1,776.63
Stationery	165,085.00	1,454.49
Bank charges	19,630.00	172.95
Sub-total¹	33,997,981.25	299,541.68
Payments being processed	4,787,103.00	42,177.12
Total expenses	38,785,084.25	341,718.80
Current balance*	68,390,906.75	593,752.49

* Some expenditures such as the post-congress retreat in Mombasa, production of congress proceedings, final payment to virtual platform to the service provider, communications expenses incurred by NOC members, KALRO expenses, etc. are to be determined and be paid.

USD Account

The total income which was received from various sponsors, registration of delegates and loan from IGC/IRC was USD 248,396.36 (Table 13). The expenditure transacted through this was USD 133,647.78

Table 13: Income and Expenditure from the USD Account

Income Received	Amount (USD)
Total income*	248,396.36
Expenses so far incurred	
Delegates Registration Fee Refund	98,020.02
Contracted services	10,904.41
IG & IR transfer to KES Account	5,000.00
Conference facilities	1,919.56
Bank charges	1,189.81
Sub-total	117,033.80
Payments being processed	16,613.98
Total expenses	133,647.78
Current balance**	114,748.58

* Includes funds from delegates who had paid full registration fees for the physical congress and those who paid for tours before changing to a full virtual congress. Delegates were expected to register with USD 460 per person to attend the physical congress in Nairobi but this was reduced to USD 230 per person and USD 155 for students after changing the congress to full virtual event. Those without oral papers presentations registered with USD 100 per delegate to get credentials to log into the congress. Tours were not held after changing to a virtual congress. The balances for those who had registered for physical congress and those who had paid for tours were refunded.

** These were pending payments e.g. the USD 20 levy per delegate to be paid to IGC and IRC, expenses to support the Traditional Knowledge Forum Webinars, refunds of balances for registrations and tours, etc. which will be settled later.

Delegate attendance and registration

The congress was attended by about 675 delegates. There were the people who had been provided with logging credentials to participate in the Congress. The delegates included those delegates who individually paid for registration through the on-line payments system or sent the registration fees directly to the congress account, and those who were provided with complementary registration under the benefits to sponsors of different categories. There were also those who were supported by the NOC and these included the NOC and Continuing Committee members, the general delegates who did not submit oral papers or posters, students and other delegates who presented oral papers (Table 14).

Table 14: Category of Delegates who registered for the Joint IGC-IRC Kenya 2021

S. No.	Category of delegate	No
1	Online registrations	195
2	Direct bank transfer	66
3	Complementary registrations for sponsors	20
4	NOC members	20
5	Delegate Support by NOC @ USD 230 for delegates with oral presentations (pre-recorded)	112
6	Delegate support by NOC@ @USD 155 for students with oral presentations (pre-recorded)	43
7	Delegate support @ USD 100 for all other delegates without oral presentations (including delegates with posters)	219
	Total	675

Congress Sponsors and Supporters

Below is a list of the international and local sponsors and supporters who provided different amounts of funds to NOC for the successful hosting of the congress (Table 15 and Table 16).

Table 15: List of International Joint IGC-IRC Kenya 2021 Sponsors

Name of sponsor/supporter	Amount of sponsorship (USD)
International sponsors	
USDA -Agricultural Research Service (USDA-ARS)	60,000.00
USDA-Natural Resources Conservation Service (USDA-NRCS)	30,000.00
Canada Organizing Committee	14,672.50
Colorado State University	11,500.00
CIRAD/INRAE/FAO-GASL	10,000.00
Southern Gulf NRM	1,248.20
CIGAR	2,455.00
Southern Queensland (SQ) Landscapes	1,509.50
Total	131,385.2

Table 16: List of the Joint IGC-IRC Kenya 2021 Local Sponsors

Local sponsors	Amount of sponsorship (USD)
GoK	932,828.11
Kenya Seed Company	2,643.17
Total	935,471.29

Success from the Financial and Fundraising Sub-Committee perspective

The sub-committee was successful in implementing its activities mainly because there was adequate funding provided by the Government of Kenya and the International sponsors. The virtual congress was also relatively less costly compared to an in-person event.

Lessons learnt from the Financial and Fundraising Sub-Committee perspective

- (a) Leadership and financial support by host country's Government is very critical for success of the Congress of this magnitude.
- (b) Good cooperation of NOC committee members on financial management issues is important.
- (c) Close follow up with potential sponsors is critical to ensure they honour their pledges.
- (d) A number of organizations that would have sponsored the Congress and participated in the exhibitions pulled out when the Congress was converted to complete virtual. Some cited the financial challenges due to the COVID 19 pandemic, which affected their businesses.
- (e) Change from an in-person to virtual Congress affected the registration of delegates as most wanted to visit Kenya for the Congress and participate in the tours.
- (f) The online payment system frustrated some delegates during registration when payments using credit cards could not complete for various reasons. Some delegates ended up making payments directly to the congress bank account.

**ANNEX 1: XXIV IGC BUSINESS MEETING MINUTES – ALL VIRTUAL MEETING
OCTOBER 27 2021 FROM 2:15 TO 3:45PM IN KENYA**

	Item
	Opening Comments • Dr Ray Smith thanked attendees at the IGC Business Meeting and acknowledged the tremendous efforts of the Kenyan National Organising committee in organising this congress. • The congress in Kenya has been jointly organised between IGC and IRC. Circumstances dictate that the next two will be IGC only in USA in 2023 and in Europe probably in 2027 celebrating the 100th anniversary.
	IGC Continuing Committee Members • Ray Smith thanked members of the Continuing Committee (CC) for their contributions since the last Congress in India in 2015. • We have suggested that the terms for current IGC CC members be extended until 2023 given that the IGC constitution requires members to be nominated from attendees at the Congress. This was not possible with the Virtual nature of this year’s congress (see resolution 6 below). • There have been two changes necessitated by current CC members being unable to complete their term. ○ Dr.agr.Iveta Gutmane, Latvia completing the term of Dr. Alexander Adamovich, Latvia. ○ Dr. Christian Huyghe, France completing the term of Dr Jean-François Soussana, France. • Appendix A shows all current IGC Continuing Committee members
	Review and Approval of Minutes • Motion: That the minutes from 2015 Congress are a true and accurate record ○ Moved: D Woodfield / P Ballerstedt CARRIED
	Review of Resolutions from XXIII IGC • Dr Smith read out the actions that had been taken by the Continuing Committee in response to the resolutions from IGC XXIII in India in 2015. • Appendix A lists the 2015 Resolutions and actions taken.
	Constitution Amendments • No Constitutional amendments were received in the period required leading up to the XXIV IGC congress.

IGC History

- A comprehensive update of the IGC history has been written by Dr Vivien Allen and Dr Roger Wilkins as the primary authors and additional with input from Co-authors Dr. Garry Lacefield and Dr. Ray Smith.
- This history is available via the IGC website under publications (pdf can be downloaded for free or hardcopy ordered for \$26.75 plus shipping).

IGC Proceedings

- The majority of proceedings papers presented at the last 5 IGCs are now available via a link on the IGC website to the site UKnowledge. (This project has been funded primarily by the University of Kentucky library system for which we are very grateful. Supplemental funding from the Forage and Grassland Foundation (private foundation started from the profits of the XIV IGC in Lexington, KY).
- The Proceedings site has an internal search function or one can use any search engine to find papers by using author's name and keywords from one of their Proceedings papers. Once found papers can be read from the site or downloaded free. If this simple search does not work, then add International Grasslands to the search. A record of the number of downloads will also be provided for author's vitae. The International Grasslands Congress recently obtained copyright permission from Wageningen Academic Publishers for the XX IGC in Ireland (2005) to be included in the searchable database, previously this Proceedings could only be purchased as a hard copy or e-book. To reach the main site go to internationalgrasslands.org under click on publications or google International Grassland Proceedings.

Announcement and Invitation to the XXV IGC Congress in Kentucky USA 14-19 May 2023

- An extensive video was played inviting all delegates to Kentucky in May 2023. The venue will be in Northern Kentucky and in the wider Cincinnati area.
- The last time the IGC was held in USA was in 1981. The meeting will be organised and hosted by the American Forage and Grassland Council.
- A call for papers has been developed and will be re-released following the conclusion of IGC XXIV.
- First announcement is already on the IGC website.
- The date for title/summary submissions is 1 June 2022.
- The Organising committee are also asking for potential thematic sessions by 1 April 2022.
- A series of proposed pre-congress and mid-congress tours were outlined.
- Members at the business meeting reinforced the need for low-cost hotel packages to be available for delegates given that USA is a high-cost region for many people.
- The Organizing Committee is raising funds specifically designated for delegate sponsorships.
- Announcement of venue for XXV IGC in 2023 – USA. <https://internationalgrasslands.org/igc-2023/>

100th IGC Congress 2027

- Dr Frank Ewert and Dr Jurgen Pickert proposed Leipzig as the venue for the 100th anniversary IGC in 2027.
- They outlined the range of German organisations in the Grassland and Forage Community that have expressed their support for this event and two Government ministries in Saxony and Brandenburg regions.
- Julius Kuehn Institute – Grassland Science focus - interested in supporting this congress
- Thunen Institute
- Venue proposed is very near the location of original 1927 International Grassland Congress.
- Potential dates and pre- and post-Congress tours were discussed.
- It will be important to ensure that we avoid conflicts with timing of the European Grassland Federation meetings.
- Other groups can still propose other venues for this Congress and a full bid must be submitted to the IGC Continuing Committee before a final venue is confirmed. At present, the Leipzig bid is the only serious contender. Besides Leipzig, only convention bureaus have expressed interest, but none are connected with a grassland organization.

Resolutions from IGC XXIV

The IGC Resolutions Committee (Dr Derek Woodfield, Dr Fernando Ortega, Dr Ray Smith & Babo Fadlalla) presented the following resolutions to attendees.

Resolution 1 – The members of the XXIV IGC congratulate the Kenyan Organizing Committee for their perseverance in putting together an excellent Congress in the face of an unprecedented pandemic that caused its delay until 2021 and ultimately resulted in a move to a virtual congress. The congress plenary sessions were informative and the volunteer oral and poster presentations provided an excellent overview of grasslands around the world. *Carried: Unanimously*

Resolution 2 - We thank the sponsoring organizations for their financial and in-kind support of the XXIV IGC particularly given the global financial situation associated with Covid-19. Sponsorship is a critical component in minimising registration costs for delegates, therefore, we recommend that the IGC continuing committee appoint a sub-committee to assist the XXV IGC Local Organizing Committee in identifying the appropriate contacts for sponsorship. *Carried: Unanimously*

Resolution 3 – That the XXV IGC Organizing committee make every reasonable effort to enable participants from as many countries as possible to attend by keeping costs low (including a range of accommodations), providing delegate sponsorship, and make every effort to promote the Congress Internationally. *Carried: Unanimously*

Resolution 4 – That ten dollars USD per attendee earned during the XXV IGC Congress should be provided to the IGC Continuing Committee as start-up funds for the next congress and to support early career researchers attending the congress. *Carried: Unanimously*

Resolution 5 – The Continuing committee should commission a study on the Global future of grasslands and present this at the 100th anniversary of the IGC in 2027. The study would involve all relevant stakeholders. *Carried: Yes from 87% of those voting*

Resolution 6 – That the term of the current IGC Continuing Committee members be extended until the next in-person IGC Congress 14-19 May 2023 in the USA since our constitution requires that “new members shall be nominated from the participating delegates in attendance at the Congress”. Consultations with past IGC CC Chairs provided the recommendation that new members should be

Other business

- None

Meeting closed 3.48pm EAT

1. Appendix 1 – Current IGC Continuing Committee Members

Appointed in 2015

Region III [South America] Dr. Fernando Ortega, Chile

Region VI [East Asia] Dr. Joung-Kyong Lee, South Korea

Region VII [Middle East] Dr. Hayatullah Esmati, Afghanistan

Region VIII [Mediterranean] Dr. Ates Serkan, Jordan

Region X [Northern Eurasia] Dr. Alexander Adamovich, Latvia – Term will be completed by Dr. agr. Iveta Gutmane, Latvia

Region XI [Africa] Dr. Babo Fadlala, Sudan

India Organizing Committee serves one term - Dr. P.K Ghosh, India

Appointed in 2013

Region I [Canada, USA] Dr. Ray Smith, USA – Chair CC

Region II [Central America] Dr. Fernando Ibarra Flores, Mexico

Region IV [South East Asia] Dr. P. K. Ghosh, India

Region V [Oceania] Dr. Derek Woodfield, New Zealand

Region IX [Europe] Dr. Jean-François Soussana, France – Term will be completed by Dr. Christian Huyghe, France

2. Appendix 2 – Response and Actions to Resolutions from XXIII IGC India

Resolution 1 – The members of the XXIII IGC congratulate the Indian Organizing Committee for putting together an excellent congress and we also thank the sponsoring organizations for their financial and inkind support. The congress plenary sessions were informative and the volunteer oral and poster presentations provided an excellent overview of grasslands around the world. The Organizing Committee is especially commended for publishing “Grassland: A Global Resource Perspective”. This will be a foundation text on the world’s grassland resources for many years to come. Carried: Unanimously **Thank-you again Dr Ghosh for this very successful meeting**

Resolution 2 – The XXIV IGC Organizing committee make every reasonable effort to enable as many countries as possible to attend by keeping costs low (including a range of accommodations) and make every effort to promote the Congress Internationally. Carried: Unanimously **This was an important factor in setting the low registration fee for Kenya when it was in-person and setting a low virtual Congress fee.**

Resolution 3 – Since sponsorship is a key component of keeping registration costs at a reasonable level, the IGC continuing committee should appoint a sub-committee to assist the local Organizing Committee in identifying the appropriate contacts for sponsorship. Carried: Unanimously **We did not do a good job with this but neither did the IRC Continuing Committee. Jim O’Rourke, the IRC Secretary, obtained the majority of the sponsorship.**

Resolution 4 – The IGC continuing committee should appoint a sub-committee to assist the local Organizing Committee in assigning papers to the appropriate themes. Carried: Unanimously **We assisted with this and thanks to all those committee members who were active reviewers.**

Resolution 5 – Ten dollars USD per attendee earned during the congress (starting IGC XXIV) should be provided to the IGC Continuing Committee to be startup funds for the next congress

and to support early career researchers attending the congress. Carried: Unanimously **This will be collected from Kenya. Ten dollars USD for IGC and ten dollars for IRC for every delegate. We did not use these funds for early career researchers since Jim sponsorship dollars were all designated for delegate sponsors and these funds were not all used.**

Resolution 6 – The Organizing Committee of the XXIV IGC should give strong consideration to incorporating a mid-congress grassland tour into the congress program and to design some of the pre- and post-congress tours to highlight African grassland agriculture.

Carried: Unanimously **Extensive tours were planned for Kenya and we already have good pre and mid-Congress tours options planned for IGC 2023.**

Resolution 7 – Continue the Early Career Researchers Forum that was started in Australia and insure that early career researchers are included as keynote speakers. Carried: Unanimously **An early career research forum will not happen in Kenya, but one is planned for IGC 2023. We should commit to early career researchers for keynote speakers. An effort was made in this regard for Kenya.**

Resolution 8 – Given the demonstrated benefits of the joint IGC-IRC 2008 meeting in China and considering the worldwide decreasing number of researchers as well as funds available for research in grassland and rangeland, the members of the XXIII IGC recommend that future IGC Continuing Committees make every endeavor to conduct joint activities with the IRC in order to maximize synergies in knowledge, practice, and resources. Carried: Unanimously **As you know, Kenya 2021 is a joint Congress. We have a very good working relationship with IRC and look forward to continued joint meetings in the future. We have been very supportive of the International Year of Rangeland and Pastoralists Initiative spearheaded by IRC. Looking forward, IGC has a Congress in the USA in 2023 and IRC has a Congress in Australia in 2025. Since 2027 is the 100th Anniversary of IGC it is not planned to be a joint Congress.**

Resolution 9 – The Continuing committee should commission a study on the Global future of grasslands and present this at the XXIV IGC. The study would involve all relevant stakeholders. Carried: Unanimously **This is a resolution that has not been followed up on, but may be one to consider going forward, especially with our 100th Anniversary approaching. IRC commissioned a similar study. Here is the link**

<https://www.unep.org/resources/report/case-benign-neglect-knowledge-gaps-about-sustainability-pastoralism-and-rangelands>

Resolution 10 – In order to move the IGC Conference Proceedings to a higher scientific level, the Continuing Committee should pursue having the proceedings approved by Thompson Reuters to be listed in the Conference Proceedings Citation Index and be designated with an ISBN number.

Carried: Unanimously **I have been advised by our librarian that ISBN numbers are only for books and not Proceedings, but we have made great progress on our initiative to have all IGC Proceedings online and completely searchable. This project is in collaboration with the University of Kentucky library. A simple google search with appropriate keywords will now find individual Proceedings papers from the last 4-5 Congresses. We have just obtained permission from the publisher of IGC 2005 in Ireland to make these papers**

available for free on this website. Previously, only the hard copy or ebook of the Proceedings could be purchased. Authors can also obtain data on the number of downloads for their papers. We are planning to go back to 1927. We may limit the papers from the first two Congresses since we likely want to translate these from their original language of German.

ANNEX 2: IRC BUSINESS MEETING MINUTES – ALL VIRTUAL MEETING

Continuing Committee and Business Meeting Minutes

XI International Rangeland Congress Kenya – held as a Worldwide Virtual Congress

Sunday October 25 – Friday, October 29, 2021

- 1) One Continuing Committee Meeting was held on Sunday, October 25 and one meeting on Friday, October 29 Congress. Delegates were not invited to first meeting October 25th and did not attend. Congress delegates were invited to the second meeting on October 29th; attendance is recorded in Minutes of this meeting.
- 2) Traditionally two Business Meetings have been held, one on Sunday or Monday in which the Resolutions Committee and the Nominations Committee are introduced to the entire delegation in order for delegates to contact these people to submit resolutions and nominations, which then get voted on in the second Business Meeting traditionally held on Friday. At this Congress only one Business Meeting was scheduled, that on Wednesday, October 27, 2021. This did not give delegates the opportunity to submit resolutions or nominations during the week of the congress and resulted in a second Business Meeting held on Friday, October 29, 2021.
- 3) Opening and Welcome

OPENING REMARKS IRC BUSINESS MEETING

Wednesday 27 October 2021, by President Dana Kelly

“The aim of the International Rangeland Congress is to promote the interchange of scientific and technical information on all aspects of rangelands: research, planning, development, management, extension, education and training” (<https://rangelandcongress.org> 2021 p.1). To achieve this aim, the key activity to date for Continuing Committee (C.C.) members is to help organise an International Rangeland Congress (IRC), normally held every 3-5 years.

Organising an International Congress

We have excellent Congress Planning Guidelines, which go into detail about the various committees that need to be formed, exactly what those committees need to do and, most importantly, *by when*. These guidelines are on the IRC web-site (<https://rangelandcongress.org> Future Congresses tab) and are up-dated after every Congress. This time, the Guidelines will need considerable up-dating because this first Congress to be in a virtual format.

Organising an international congress that normally attracts between 500 to 1000 delegates (and over 1,500 in China) with several concurrent streams, is *much more* time consuming than most people realise. This is especially true if the country or organisation hosting the congress has not run many or any conferences of this size and scope. Surprisingly for many, organising papers and publications is the easiest part, even though it is perhaps the most visible and important part of the congress. Scientists organising scientifically-focused tours, negotiating contracts with hotels, coordinating bus timetable to pick everyone up from hotels amongst traffic jams — these are tasks that do not come naturally.

The Continuing Committee

The current C.C. has highlighted various other activities and actions that the C.C. could be involved with. These ideas have evolved from various chats over the past few years and culminated in an excellent discussion at our Sunday C.C. meeting. One of these activities is of course, the International Year of Rangelands and Pastoralists (IYRP).

I think it is time in the evolution of the IRC C.C. to consider the role of the committee and the roles of the various C.C. members. Up until now, too much responsibility for helping with the up-coming Congress has left to the IRC Secretariat and the President, and this is not sustainable. As member of the C.C. for 5 years before I become President, I must admit I did not feel very engaged and had little to do. Our discussions about the possible future roles for the C.C. have been developed into Resolutions.

I would like to take this opportunity to thank the Resolutions Sub-Committee for the sterling job they have done in taking our rambling discussions and developed these into some coherent and concise resolutions. These are quite open and really leave the job of refining what happens next to the new C.C.. As the retiring past President, I have an ex-officio position on the new C.C. so I'm around to continue these discussions with you. I would be glad to do so. While I had lots of ideas about how the C.C. could develop, I ended up too busy with the Kenyan Congress organisation to do anything else.

Indigenous and Traditional peoples

One thing I was involved with was how the Congress could better in terms of sharing the perspectives of Indigenous and Traditional Knowledge holders. While this is a passion of mine, this desire to hear more from Indigenous peoples has been reflected in IRC Resolutions for some time. The first significant mention was in a resolution at the Argentinian Congress in Rosario in 2011. Resolution 3 was about the *“Recognition, support and participations of Indigenous and traditional pastoral peoples”*.

My Kenyan colleagues and I had many discussions about how Indigenous people could be more involved and how to get Indigenous peoples from around the world to participate in the Congress in Kenya. An Indigenous Traditional Knowledge Forum was planned which planned to:

- bring people from Indigenous Communities around the world and take them to rural areas where they were to be hosted by several Kenyan communities. Several were involved in discussions regarding their desire to be hosts, their challenges and costs.
- bring visitors and locals back to Nairobi to spend time together to discuss their experiences.
- hold a Forum to hear from Indigenous peoples about their land management techniques, their challenges and successes, what issues they had in common as well as the differences.

Not everything that we initiated eventuated, due to chaos of Covid-19. The risks were high in bringing potentially vulnerable elders to Kenyan rural communities where vaccination rates were low and medical facilities are limited. Even though various options to minimise risks were considered, advertising around the world was not undertaken because of the uncertainties. Nonetheless, various actions were started. What did happen was that we:

- Reached out to communities around the world, making contacts.
- Initiated a film documentary about the role Indigenous Traditional Knowledge in Africa, especially in the IGAD countries in East Africa

- Formed an ITK Committee, which will continue after the Kenyan Congress committees close.
- Developed a plan for a Webinar series, which will hopefully run from 2021 until 2026, the proposed year for IYRP.

Interest in ITK is growing internationally, and we are starting to see greater awareness of the value of ITK. In Australia, interest is developing in how Australian Indigenous or Aboriginal culture may provide insights into how to manage increasing climatic variability. These insights could be in terms of land management e.g. cultural fire management; and also, in terms of governance arrangements and how to make decisions that embrace uncertainty and support resilient communities.

Next on the IRC Business Meeting Agenda

We shall now discuss the Resolutions that have been developed; as I said these indicate some possible future directions for the IRC C.C.. It is my view is that several sub-committees may be needed to help implement any new activities. I shall now hand over to James Bennett from the Resolutions sub-committee.

4) Update on IRC Secretariat

INTERNATIONAL RANGELAND CONGRESS SECRETARIAT REPORT

Submitted by James T. O'Rourke

For Period July 2016 to October 2021

1. IRC website domain name was renewed on 10/2016 (\$60.95) and 9/2021 (\$14.95).
2. IRC mailing list ability renewed annually with Linksky. Current charge on 5/2021 was \$83.40 annually.
3. Jerome Vogel has provided a tremendous amount of support with IRC mailings at very little cost. Last payment to Jerome was for \$700 on 7/ 2016.
4. Maintain MOU with Society for Range Management annually which allows IRC a complementary booth in the Trade Show at SRM Annual Meetings. Shipping charges in two cases for IRC banner to be in place.
5. A fee of \$60 was paid for typing of the IRC History, edited by Jim O'Rourke, and will be included in the Kenya Proceedings.
6. IRC office is maintained at Chadron State College Rangeland Complex where computer, photocopy, FAX and telephone services are provided to IRC at no cost. IRC Archive of all past congresses is held here. Frequent requests for copies of papers in past proceedings are received at which time photocopies are made and emailed to the person requesting these reprints.
7. Emails checked daily (or weekly during summer season). Volume is huge.
8. U.S. IRS (Internal Revenue Service) application/renewal last completed on 9/2015.

Annual Tax Preparation by firm in Chadron Nebraska maintains that tax exempt status at a cost of \$250 in 2021.

9. Annual submission of IRC Profile to Sam.gov, which is necessary to receive grants/sponsorships from U.S. government agencies.
10. Password for Grants.gov renewed every 60 days, which is also necessary to receive grants/sponsorships from U.S. government agencies.
11. Sponsorships from U.S. government agencies must be made to a U.S. entity. Thus the IRS 501c3 status (tax exempt). U.S. sponsorships made up 95% of sponsorships for the Kenya Congress. When these sponsorships are received they are wired to the Host Country. In the case of Kenya some of these funds were retained in the U.S. to make dollar payments to IRC and IGC personnel who were traveling to Kenya to provide support in order to make payment easier and avoid wiring fee charges. IRC President made 3 trips, IGC Chair made 2 trips paid by sponsorships and at least two more at his expenses, and IRC Secretariat 2 trips.
12. IRC made a loan of \$20,000 to Kenya Organizing Committee. This has been repaid by holding back that amount from sponsorships received into the IRC bank account. The loan IGC made of \$10,000 to the Kenya Organizing committee was repaid in the same fashion.
13. The IRC bank account has been used for IYRP efforts with sponsorships received for IYRP and payments made for IYRP expenses keep separately.
14. Bank statement balanced monthly.
15. See the separate IRC Financial Report.

FINANCIAL REPORT TO IRC CC

October 13, 2021

Covering period from January 1, 2015 to October 14, 2021

Submitted by James T. O'Rourke, Secretariat

EXPENSES:

1. Website	\$75.80
2. Mailing List	\$487.80
3. Jerome Vogel	\$ 700.00
4. Advertising	\$106.00
5. IRS (for 501c3 status)	\$410.42
6. Tax Preparation	\$1220.00

7. Bank Charges	\$20.00
8. Typing	\$60.00
TOTAL EXPENSES:	\$3080.02

REVENUE:

1. Interest – -\$261.31
2. Canada Profits - \$19,962.50 – Of this amount \$5290 was for the \$10 per delegate attending fee due to IRC. The remaining (\$14,672.50) was a sponsorship from Canada for the Kenya Congress. This \$14,672.50 has been used for travel by IGC and IRC personnel to and from Kenya to assist in planning preparations.

Additional Revenue and Expenses:

1. IGC and IRC travel to and from Kenya has totaled \$25,488.38. With \$14,672.50 from Canada Profits, \$2455.00 from ICARDA and \$3000.00 from CSU used for this item an additional \$5360.88 will be held back from sponsorships to Kenya to offset these expenses.
2. IRC has loaned Kenya \$20,000.00. This will be due back to IRC.
3. Items 1 and 2 immediately above, a total of \$25,360.88, will be collected from Kenya when all sponsorship funds arrive in the IRC account, with any remaining returned (wired) to Kenya.
4. The IRC bank account has been used to assist the IYRP effort. \$5500.00 has been received in sponsorships to support the IYRP. \$3677.80 has been expended. Thus \$1822.20 remains in the IRC account for use by IYRP.

Bank Balance August 1, 2017 immediately before Canada final payment to IRC
\$37,651.62

Bank Balance September 21, 2021
\$48,257.94

Less amount held for IYRP
\$1,822.20

Less amount in bank from sponsorships to be used to repay IRC/return to Kenya
\$30,000.00

Temporary Bank Balance pending repayment and Kenya \$10 per delegate fee
\$16,435.74

With repayment of \$25,360.88 in 3. above
\$41,796.62

With payment of \$10 delegate fee from Kenya (registration figures yet to be seen) ?

SPONSORSHIPS RECEIVED FOR THE KENYA IGC/IRC:

1. Canada Organizing Committee 2016	\$14,672.50
2. Agricultural Research Service (ARS) of USDA	\$60,000.00
3. Natural Resources Conservation Service (NRCS) of USDA	\$10,000.00
4. Colorado State University	\$11,500.00
5. ICARDA	\$2455.00
6. FAO on behalf of CIRAD France	\$5,000.00
5. Review of Resolutions passed at 10th IRC Saskatoon, Saskatchewan Canada 2016	

Resolutions Passed at the 10th International Rangeland Congress Saskatoon, Saskatchewan, Canada 2016

1. **INTERNATIONAL YEAR OF RANGELANDS AND PASTORALISTS**
The delegates from the member countries of the International Rangelands Congress 2016, support a United Nations designation of an International Year of Rangelands and Pastoralists in the Year 2021.
2. **GENDER & INDIGENOUS**
That future IRC Congress Organising Committees provides a forum for sharing the experiences of all genders, youth and indigenous peoples, so that their perspectives can be better integrated into science and policy regarding rangeland management.
3. **THANK YOU TO CANADA**
The delegates and the Continuing Committee of the IRC thanks the organisers of the IRC Canada Congress for an excellent congress, especially the structure of congress sessions, the program and superb organisation, in a very short space of time.
4. **MULTI-FUNCTIONALITY**
Future International Rangeland Congresses strive to highlight pastoralism as a multifunctional activity, with sessions linking production, environmental, social, cultural and institutional issues towards local development perspectives.
5. **JOINT MEETINGS**
The IRC Continuing Committee explore opportunities for joint meetings with allied groups (such as ecology, conservation, economics, social development, wildlife, live-stock and grassland groups) to address selected emerging regional/global management issues in rangelands.
6. **REPRESENTATION ON CONTINUING COMMITTEE**
The IRC strive for equal representation of men and women, and substantial representation from the global south, on the Continuing Committee.

6. New Resolutions passed at the 11th International Congress, Oct, 2021 Virtual and Mombasa, Kenya

The Resolutions Committee was co-chaired by James Bennett and Robin Reid and

included David Phelps, Elisabeth Huber-Sannwald and Tony Palmer. Eight resolutions had been received prior to the Business Meeting on Wednesday as a result of communications with delegates prior to the congress. These resolutions were reviewed by the Resolutions Committee and modifications made in consultation with the person/groups submitting the resolutions. Only one of these resolutions received suggested amendments during the Business meeting on Wednesday resulting in that resolution being voted upon during the Friday Business Meeting. The approved resolutions, as voted upon by the full delegation include:

Resolution 1: Thank you to the Kenyan Organising Committee

The continuing committee extends its gratitude to the Kenyan Organising Committee for all its hard work in pulling together the International Rangeland Congress 2021, under difficult circumstances.

Resolution 2: Congratulations to Australia

The continuing committee congratulates Australia on the award of the International Rangeland Congress 2025.

Resolution 3: Actively Work with IYRP (International Year of Rangelands and Pastoralists) (IYRP Resolution 1)

Individual Continuing Committee (CC) members of the International Rangeland Congress (IRC) will be responsible for working with other IRC delegates and the International Year of Rangeland and Pastoralists (IYRP) Global and Regional Support Groups to gain country-level commitments to support the IYRP 2026 initiative, through letters and other acknowledgements submitted to the Mongolian Government in reference to their IYRP 2026 proposal to the United Nations, until such time as the UN General Assembly designates the International Year.

Resolution 4: Mobilize Support in Countries for IYRP (International Year of Rangelands and Pastoralists) (IYRP Resolution 2)

Individual CC members of the International Rangeland Congress will be responsible for mobilizing scientists and rangeland practitioners in the countries and regions that they represent, to support and work with the Regional IYRP Support Groups in developing IYRP Action Plans concerning the activities that will be conducted prior to and during the Year. These activities will coincide with the 12 monthly themes developed by the International Support Group (ISG) of the IYRP and will be discussed at the Society for Range Management Conference in February 2022. The IYRP Action Plans should be finalized before the end of 2022, and implementation commenced in January 2023, unless otherwise decided by the Global Coordinating Group of the ISG.

Resolution 5: Establish IYRP (International Year of Rangelands and Pastoralists) Sub-Committee of the International Rangeland Congress Continuing Committee (IYRP Resolution 3)

The CC of the IRC will establish an IYRP Sub-Committee that will prepare a report identifying priority research and comparable methodologies needed to address the knowledge gap findings, including those of the Gap Analysis conducted by UNEP in 2018, by October 2022 as an input to the IYRP Action Plans. This Sub-Committee will work with the Regional IYRP Support Groups including International Agencies, amongst them UNEP, FAO, ILRI, and regularly report on progress to both the CC of the IRC and the Global Coordinating Group of the ISG.

The Sub-Committee will report on its achievements and findings to the IRC in 2025, including the implementation of these three resolutions.

Resolution 6: Establish the Kenya IYRP (International Year of Rangelands and Pastoralists) Committee

The Kenya International Rangeland Congress Organising Committee will work with the rangeland counties in Kenya to establish - in liaison with the Kenyan ministries of agriculture, livestock, and fisheries -- a joint Kenya IYRP Committee responsible for coordinating regional and country-level commitments in support of the International Year of Rangelands and Pastoralism (IYRP) 2026 initiative. This committee will also encourage members of IGAD (Intergovernmental Authority on Development, covering the countries in the Horn of Africa) to participate in the IYRP. This will include:

- Developing action plans each year until the IYRP is launched
- Identifying and supporting research priorities that support the goals of the IYRP

Resolution 7: Support international liaison for the International Rangeland Congress 2025 and beyond

The International Rangeland Congress (IRC) Continuing Committee will establish effective international liaison in support of congress attendance in conjunction with future host nation organising committees, in order to:

1. Identify historically under-represented countries at IRC and how more effective linkages might be established, e.g. with in-country organisations, to facilitate closer liaison with IRC.
2. Identify potential constraints to delegate attendance at IRC from these, and other countries, and how these might be addressed.
3. Actively build the capacity of under-represented countries to host future congresses.

Resolution 8: Explore Opportunities for Joint Congresses with Allied Groups

The International Rangeland Congress Continuing Committee will explore opportunities for joint meetings with allied groups (such as ecology, conservation, economics, social development, wildlife, livestock and grassland groups) to address selected emerging regional/global management issues in rangelands.

Resolution 9: Extend International Rangeland Congress Procedures to Include Virtual Congresses

In light of the current pandemic it is proposed that the IRC continuing committee revise existing Congress Guideline Procedures to include handling a virtual congress.

Resolution 10: Encourage and Report on Regional Activities

A strategic planning meeting of Continuing Committee (CC) members, is established after each congress to clearly identify what the roles of CC members will be for the period to the next congress. Indicative roles and activities to involve but not be limited to:

- i. Fostering communication among region members;
- ii. Promoting and encouraging the mission of the International Rangeland Congress amongst member countries;
- iii. Supporting IYRP (International Year of Rangelands and Pastoralists), participating in gap analysis of rangelands and pastoralism.

That these activities are then reported on at a meeting of CC members held every 12 months.

Resolution 11: International Rangeland Congress Continuing Committee and Organizing Committee to Establish Diversity Sub-committees

The International Rangeland Congress (IRC) Continuing (CC) and Organizing Committees (OC) will:

- Establish Sub-Committees on Diversity, Equity and Inclusion to advise on all IRC CC and OC activities, including recruiting and retaining diverse leadership and membership, conference program development and structure, keynote and session speakers and panels, scholarship awards, field trips and other activities.
- Develop a Diversity, Equity and Inclusion statement and implementation plan to guide these decisions (see examples of such a statement by the US Society of Range Management [here](#)).

Resolution 12: Incorporate Indigenous Leadership and Participation

The International Rangeland Congress (IRC) Organizing Committees will:

- Incorporate the expressed goals, participation and leadership of Indigenous Peoples of the hosting countries in all aspects of each IRC meeting.
- Apply this to leadership and membership, conference program development and structure, keynote and session speakers and panels, scholarship awards, field trips and other activities of the meeting.
- Form an IYRP (International Year of Rangelands and Pastoralists) sub-committee of the IRC Continuing Committee (CC) for this purpose and/or
- Include this role within any other relevant committees of the IRC CC.

This resolution assumes that the next IRC will be held in 2025 as currently planned and that the IYRP will be approved for 2026.

Nominations for New IRC Continuing Committee Members

CC members were encouraged to seek at least two nominations per region. Nominations had been made by CC members for persons to replace those going off the CC at this congress. Those nominations were reviewed at the CC Meeting on Sunday and presented to the full delegation at the Wednesday Business Meeting. Only one

region had more than one nomination with the voting for that region on Wednesday resulting in a tie vote. One of these nominees subsequently withdrew his nomination. Following the Wednesday Business Meeting, one other nomination came forward from another region. It became obvious that delegates had not had sufficient notice and time to submit nominations and therefore a second Business Meeting was scheduled for Friday with notice sent to all delegates to submit nominations as they wished. By the time of the Friday Business Meeting, only this one region had received an additional nomination. On Friday, all nominations were voted upon to ensure that delegates were comfortable with the nominations even if only one nomination had been received. Outgoing, Continuing and Newly Elected members are:

Region	Outgoing member 2011-2021	Continuing member 2016-2025	Nominations 2021-2029	New member 2021-2029
Australia/Oceania	Dana Kelly	David Phelps (Australia)	Nicole Spiegel (Australia)	Nicole Spiegel
Africa: Southern Africa, Sub-Saharan Africa	Anthony R Palmer	George Azenga Keya (Kenya)	Igshaan Samuels (South Africa)	
Africa: Northern Africa and Middle East	Mounir Louhaichi	Mohamed Tarhouni (Tunisia)	Nahid Naghizahed (Iran)	Nahid Naghizahed
Asia: Central Asia and Mongolia	Ayurzana Enkh-Amgalan	Dildova Aralova (Uzbekistan)	Tungalag Ulambayar (<u>Mongolia</u>)	Tungalag Ulambayar
Asia: China and East Asia	Fujiang Hou	Guodong HAN (China)	Yongfei Ba (China)	Yongfei Ba
America: North and Mexico	Elisabeth Huber-Sannwald	Robin Reid (USA)	Luis Ortega Reyes (Mexico)	Luis Ortega Reyes
South America	Cristina Genro Susana Feldman		Diego Bendersky (Argentina) Walter Ayala (Uruguay)	Diego Bendersky Walter Ayala
Europe	James Bennett	Bernard Hubert (France)	Pablo Manzano Baena (Finland)	Pablo Manzano Baena

7. Update on IRC History compilation

Jim O'Rourke reported that the History has been updated from the early History that had been compiled after the first 4 congresses. This updated History is to be included in the proceedings of this Congress.

8. Update on scanned of Congress Proceedings (past & current)

Ray Smith has organized for the proceedings of this Congress to be scanned by the University of Kentucky. Congresses since Hohhot in 2008 have been produced electronically but it is unclear if these can be accessed by the worldwide audience. Funding is needed to digitize earlier congresses.

9. No constitutional amendments were received prior to the 6 months preceding the IRC 2021 meeting, therefore there will be no changes to the constitution.

10. Presentation from IRC 2025 Australian Organizing Committee

David Phelps presented the Welcome to attend the IRC Congress to be held in Australia in 2025.

11. At the Friday, October 29, Meeting of the CC David Phelps was elected to serve as President and Robin Reid as Vice President of the IRC CC until and including the next Congress in Australia in 2025.

12. **Minutes of the Final Business Meeting, Kenyan IRC—Friday 29 October 2021 (Saturday 30 October 2021 AEST)**

Agenda:

- Vote of revised Resolution 6
- Finalise voting procedure and ratification of new committee members

Meeting opened: 1.15 am AEST (GMT+10)

Apologies: none received

Attendance (as per on-line platform at start of meeting):

- Otto Kaufmann
- Gaci Dihia
- Abdelmajid Bechchar
- Adubeker Hassen
- David Phelps
- George Keya
- Elly Sabiliti
- Mounir Louhaichi
- Nahid Naghizadeh
- Bernard Hubert
- Luis Ortega Reyes
- Robin Reid
- Anthony Palmer
- David Briske
- Jacob Barasa Wanyama
- Maria Fernandez-Gimenez
- David Kariithi
- Cecile Godde
- James Bennett
- I Samuel
- Cecilia Turin
- Ann Waters-Bayer
- Elizabeth Huber-Sanwald
- Diego Bendersky
- Julius Tjelele
- Mulisa Faji Dida
- Khuliso Ravhuhali
- James O'Rourke
- Mohamed Tarhouni
- Anna Seidel

- Gabriel Olivia
- Charne Viljoen
- Clement Cupido
- Nicole Spiegel
- Otgontuya Lkhagvajav

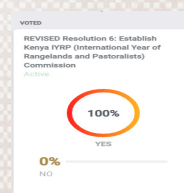
Please note: 33 people actively in attendance. Another 69 people had entered the meeting at some point (names were not recorded).

Dana Kelly opened the meeting by welcoming all delegates and noting there would be a meeting of the new committee at the end of this meeting. It was noted that all delegates are welcome to attend both meetings. Dr Kelly explained that voting needed to be re-done for the revised Resolution 6. Whilst this was put to the First business meeting on Wednesday and passed, the voting results were not recorded in the system.

Dr Kelly then opened the floor for discussion (via the type-in discussion facility online).

Voting proceeded.

Revised Resolution 6 was passed unanimously.



Dr Kelly then formally opened the procedure to appoint new committee members. She thanked the outgoing members: Anthony Palmer; Mounir Louhaichi; Ayurzana Enkh-Amgalan; Fujiang Hou; Elisabeth Huber-Sannwald; Cristina Genro; Susana Feldman; James Bennett; and noted that she had also completed the maximum allowed two terms on the IRC CC.

Dr Kelly then explained that nominations for committee positions had been requested prior to the First business meeting through all IRC CC representatives. This was a pragmatic decision to ensure enough time to implement the polling procedure on the virtual platform. Nominations were received for each region prior to the First Business meeting.

Nominations had been ratified and voted on at the First Business Meeting on Wednesday. However, a nomination was received during the first business meeting. This is allowed under the IRC CC constitution and therefore needed to be considered. It was acknowledged that it was possible that not all delegates had received fair notice to lodge nominations prior to the First business meeting.

The IRC CC nominations committee met out of session and determined that all existing and new nominations should be reconsidered at the Final business meeting on Friday, to ensure procedural fairness under the constitution.

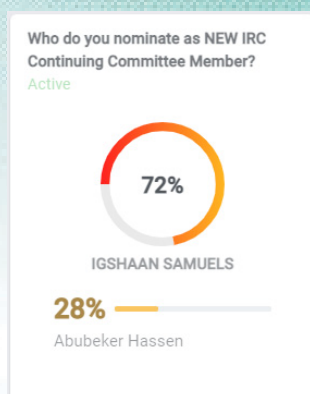
In a first for the IRC CC, there was a tied vote during the First meeting, between Brandon Bestelmeyer (USA) and Luis Ortega (Mexico) who were both nominated as representatives for the America: North and Mexico region. A second call for nominations was issued to all delegates via the virtual platform notification system during Thursday 28 October 2021. This second call closed at 7pm (EAT, GMT+3) Thursday 28 October 2021. Prior to the close of the second call for nominations, *Brandon Bestelmeyer (USA) withdrew* to ensure the successful nomination of Luis Ortega and that the North American region retained representation from Mexico.

All other previously received nominations were noted as received. One additional nomination that met all requirements was received, which triggered the need for a vote on the representative for the Southern Africa and Sub-Saharan Africa region.

Dr Kelly read the list of nominees where voting was not required, and the meeting welcomed the following new committee members by acclamation:

- Nicole Spiegel (Australia/Oceania)
- Nahid Naghizahed (Africa: Northern Africa and Middle East)
- Tungalag Ulambayar (Asia: Central Asia and Mongolia)
- Yongfei Ba (Asia: China and East Asia)
- Luis Ortega (America: North and Mexico)
- Diego Bendersky and Walter Ayala (South America, two vacancies)
- Pablo Manzano Baena (Europe)

Dr Kelly called for nominees or others to discuss the two nominations for the Southern Africa and Sub-Saharan Africa region, via the type-in discussion facility.



Voting was then opened, with sufficient time given for all delegates in attendance to vote. The final displayed vote was 72% in favour of Igshaan Samuels and 28% in favour of Abubeker Hassen. It should be noted that the voting system did not allow voters to change their vote.

Dr Kelly announced that Igshaan Samuels led the poll by a substantial margin and that an official statement would be provided once the count was finalised after the meeting closed. Dr Kelly thanked both candidates for their interest in contributing to the international community through the IRC CC.

Dr Kelly, then announced that the position of President and Vice-President were vacant, and called for nominations to the position of President.

Robin Reid (USA) nominated David Phelps of Australia. Dr Phelps accepted the nomination. Delegates were then given time to offer additional nominations; none were received. Dr Phelps was ratified by acclamation as President until the next IRC. Dr Kelly then stepped down as chair of proceedings and Dr Phelps assumed the role and oversaw voting for the position of Vice-President.

Dr Phelps called for nominations to the position of Vice-President. Nicole Spiegel (Australia) nominated Robin Reid (USA). Dr Reid accepted the nomination. Delegates were then given time to offer additional nominations; none were received. Dr Reid was ratified by acclamation as Vice-President until the next IRC.

A motion of congratulations and gratitude for the work of Dr Dana Kelly as President for 2016-2021 was moved by David Phelps, seconded by Robin Reid and supported by acclamation and expressions of support from the meeting delegates. A motion of gratitude for the decades of hard work and support to the committee by James (Jim) O'Rourke as IRC CC Secretariat was moved by Dana Kelly and seconded by Robin Reid and resoundingly supported by acclamation and expressions of support from the meeting delegates.

The meeting was closed at 1.36am AEST (GMT+10).

All delegates were invited to stay for the first meeting of the new IRC CC.

Minutes of the first IRC Continuing Committee Meeting with the 2021-25 committee, Kenyan IRC—Friday 29 October 2021

The first meeting of the new IRC CC (2021-2025) was then held, chaired by Dr Phelps. It was noted that all delegates were welcome to attend and to provide discussion.
International Rangeland Congress Continuing Committee (IRC CC)

First business meeting of the 2021-25 committee, Kenyan IRC—Friday 29 October 2021

Meeting opened: 1.37 am AEST (GMT+10)

Apologies: none received

Attendance (as per on-line platform at start of meeting):

- Ann Waters-Bayer
- Anna Seidel
- Bernard Hubert
- Cecilia Turin
- David Briske
- David Phelps
- Diego Bendersky
- Elly Sabiliti
- Gabriel Olivia
- Gaci Dihia
- George Keya
- Jacob Barasa Wanyama
- James O'Rourke
- Luis Ortega Reyes
- Mohamed Tarhouni
- Nicole Spiegel
- Robin Reid
- YongFei Bai
- Solomon Tefera Beyene
- Yohana Ogom
- Caroline Kute
- Jose Luis Zaragoza Ramirez
- Mulisa Faji Dida
- Tungaa Ulambayar
- Walter Ayala

Dr Phelps noted his intention to build the committee as team based on shared values, goals and actions; to work to implement the Resolutions passed at the Congress; and to work with the Australian Organising Committee and the International Year or Rangelands and Pastoralists support groups to support successful events and raise the profile of rangelands and pastoralists over the coming years.

Dr Reid noted her intention to lead the implementation of more formal structure for the IRC CC and of the Resolutions passed.

Both noted that there are many passionate, dedicated and innovative professionals globally whose assistance to the IRC CC will be gratefully accepted to deliver this agenda of enhancing the capacity and impact of the IRC CC.

Meeting closed 1.59am AEST (GMT+10).

International Rangeland Congress Continuing Committee members (2021 -)

Region	Outgoing member 2011-2021	Continuing member 2016-2025	Nominations 2021-2029	New member 2021-2029
Australia/Oceania	Dana Kelly	David Phelps	Nicole Spiegel	Nicole Spiegel
Africa: Southern Africa, Sub-Saharan Africa	Dr Anthony R Palmer	George Azenga Keya	Igshaan Samuels Abubeker Hassan	Igshaan Samuels
Africa: Northern Africa and Middle East	Mounir Louhaichi	Mohamed Tarhouni	Nahid Naghizahed	Nahid Naghizahed
Asia: Central Asia and Mongolia	Ayurzana Enkh-Amgalan	Dildova Aralova	Tungalag ULAMBAYAR	Tungalag Ulambayar
Asia: China and East Asia	Fujiang Hou	Guodong HAN	Yongfei Ba	Yongfei Ba
America: North and Mexico	Elisabeth Huber-Sannwald (Mexico)	Robin Reid (USA)	Brandon Bestelmeyer (USA) (withdrew following a tied vote) Luis Ortega (Mexico)	Luis Ortega

South America	Cristina Genro Susana Feldman		Diego Bender-sky Walter Ayala	Diego Bender-sky Walter Ayala
Europe	Dr James Bennett	Bernard Hubert	Pablo Manzano Baena	Pablo Manzano Baena

ANNEX 3: OPENING SPEECH BY THE CHIEF GUEST, HON. PETER G. MUNYA, CABINET SECRETARY



SPEECH BY THE HON. PETER G. MUNYA, CABINET SECRETARY, MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVE (KENYA) DURING THE OFFICIAL OPENING OF THE JOINT 24TH INTERNATIONAL GRASSLAND CONGRESS AND 11TH INTERNATIONAL RANGELAND CONGRESS, KENYA 2021

The Chairman, Continuing Committee of the International Grassland Congress
The President, Continuing Committee of the International Rangeland Congress
The Chief Administrative Secretaries, present
The Principal Secretaries, present
The Chairman, Animal Production Society of Kenya
Distinguished Participants
Distinguished Guests, Practitioners Pastoralists and farmers Ladies and Gentlemen,

It gives me great pleasure to participate in this auspicious occasion of the opening of the Joint International Grassland and Rangeland Congress, Kenya 2021. I am informed this is the 24th International Grassland Congress and the 11th International Grassland Congress. Although the two congresses have been held for many years, with International Grassland Congress having a history of 100 years, I am informed that this is the first such joint congress in Africa, and the first virtual congress for both IGC and IRC. I want to take this early opportunity to thank the IGC and IRC continuing committees for the decision to hold this first joint meeting in Africa, here in Nairobi, Kenya.

Ladies and Gentlemen

The theme of the conference is ‘Sustainable Use of Grassland/Rangeland Resources for Improved Livelihoods’. This theme is very appropriate at this time in the history of mankind when we have challenges ranging from climate change to Covid-19 pandemic.

I am informed that the Congress is organized under seven thematic areas of rangeland and grassland research and development, with a good balance between the people, social, policy and more traditional topics. I am also informed that the congress will cover 40 sessions each dealing with a particular aspect of grassland and rangeland. This is very high concentration of information that should definitely be useful in managing grassland and rangeland going forward.

Ladies and Gentlemen

The importance of grassland and rangeland to the economy of Kenya and indeed for the Horn of Africa cannot be over emphasized. In Kenya the rangeland cover over 83% of the land mass and are home to 70% of the livestock and 83% of the wildlife. Over 10 million people derive their livelihoods from the existing natural resource in these areas.

Due to the importance of grassland and Rangeland, my Ministry has developed the Range Management and Pastoralism Strategy 2021-2031. The Strategy provides deliberate direction towards the realization of sustainable development of the rangeland in Kenya, recognizing the need for climate change adaptation and mitigation for better livelihoods, which is part of Kenya's obligation as a signatory to the United Nations Framework Convention on Climate Change. The strategy has clear objectives of reducing land degradation, restoring degraded areas, while increasing land productivity; sustainably exploring the existing natural resources, development and adoption of appropriate technologies; support enterprise development and marketing of products; and promotion of other sustainable livelihoods in the rangeland besides livestock production. This is also articulated through, the Kenya's Vision 2030, the Presidential Big Four Agenda and the Agricultural Sector Growth and Transformation Strategy 2019-2029, which all identified agriculture as one of the key sectors to deliver the economic growth rate envisaged in our development plan.

Ladies and Gentlemen

My Ministry recognizes the role of agricultural research and understands that the success of the sector is attributable to agricultural research and development initiatives over the years. I am glad that the Joint International Grassland and Rangeland Congress brings together scientists, policy makers and practitioners to promote the interchange of scientific and technical information on all aspects of grassland and rangeland: including ecology; forage production and utilization; livestock production systems; wildlife, tourism and multi-facets of grassland and rangeland; drought management and climate change in rangeland; pastoralism, social, gender and policy issues, and capacity, institutions and innovations for sustainable development. I hope this scientific and technical information will be used to improve the productivity of the grassland and rangeland globally - including Kenya and the Horn of Africa.

Ladies and Gentlemen

Allow me to turn to climate change issues. The productivity of the grassland and rangeland has been under threat in the recent decades due to various factors. These include climate change and variability especially frequent droughts, fires and floods; land degradation and loss of biodiversity. These have threatened the sustainability of rangeland resources and created economic and environmental challenges that need urgent attention to safeguard the well-being of the communities especially the pastoralists. Urgent measures and interventions are therefore required to protect the grassland and rangeland resources and enhance their sustainable utilization. Kenya and indeed the Horn of Africa countries are currently facing a major drought that is threatening the productive assets of the pastoralists, their livestock. I recently declared the current drought a national disaster to enable the country mobilize resources to protect the livelihoods of the people living mainly in the arid and semi-arid grassland and rangeland of Kenya.

My Ministry recognizes the threat climate change poses to sustainable development and is actively integrating climate change information into national policies. In this regard, Kenya launched its National Climate Change Response Strategy in 2010. The focus of the strategy is to enable Kenya reduce vulnerability to climate change and to improve the country's response to climate change.

Kenya is also a signatory to the UN Framework Convention on Climate Change and the Kyoto Protocol. Kenya signed and ratified the Paris Agreement and the country has been an active

participant in the Conference of Parties. Kenya has also ratified the United Nation Convention to Combat Desertification which is the sole legally binding international agreement linking environment and development to sustainable land management.

While the United Nations Convention to Combat Desertification address the reduction of land degradation; enhanced land productivity; sustainable utilization of the natural resources; development, adoption of appropriate technologies; support enterprises development, marketing of products; and promotion of other sustainable livelihoods in the rangeland besides livestock production, the Kenyan Strategy and Action plan is our commitments towards halting and reversing land degradation, restoring degraded ecosystems and sustainably managing our land resources. The major focus of these national strategies and action plans is mainly addressing the grassland and rangeland ecosystems that constitute over 80% of Kenya's landmass.

Ladies and gentlemen

Kenya is committed to ending drought emergencies and my Ministry has developed the National Drought Management Strategy which aims to building the resilience of the communities living in the rangeland of Kenya. Through Ending Drought Emergency Strategy, my Ministry has set out a system that will help us respond to drought emergencies in good time to prevent human suffering and death and also to protect the productive assets of our livestock keepers. In this regard, my Ministry has set aside funds that can be mobilized quickly whenever we have a drought emergency. In addition to this, my Ministry has piloted and is now together with the private sector is implementing index based livestock insurance scheme to protect pastoralist livestock.

I am glad to note that the congress gives attention to climate change issues and has a theme on drought and climate change. I hope the papers presented under this theme will underscore the urgency for all of us to unite in addressing climate change issues globally.

Ladies and Gentlemen;

I take this opportunity to thank the organizers for electing to hold this congress in Nairobi and also underscore the efforts put in to make sure the congress is successful considering the challenges caused by the Covid-19 global pandemic. I am informed that during normal times, the congress is attended by at least 1,200 delegates. It would have been my wish and pleasure to have you all physically in Kenya as you share your knowledge and experiences on matters grassland and rangeland, and to appreciate Kenya's landscape. Although you are holding a virtual meeting due to the Covid-19 pandemic, I want to take this opportunity to welcome you all to Kenya. Whenever you can please come and enjoy our world class hospitality, wonderful and unique wildlife, and our cultures.

Lastly, I congratulate the organizers for organizing this great congress and putting together world class keynote speakers to address important issues that affect grassland and rangeland globally.

It is now my pleasure to declare the Joint 24th International Grassland and 11th International Rangeland Congress 2021, officially open.

THANK YOU VERY MUCH AND GOD BLESS YOU.

ANNEX 4: OPENING REMARKS BY PROF. HAMADI BOGA, PRINCIPAL SECRETARY



OPENING REMARKS BY PROF. HAMADI BOGA, EBS, CGH, PRINCIPAL SECRETARY (PS), STATE DEPARTMENT FOR CROP DEVELOPMENT AND AGRICULTURAL RESEARCH, MINISTRY OF AGRICULTURE, LIVESTOCK FISHERIES AND COOPERATIVES, NAIROBI, KENYA

Chief Administrative Secretary, Ministry of Agriculture Livestock Fisheries and Cooperatives, State Department for Livestock, Lawrence Omuhaka
Principal Secretary, State Department for Livestock, Harry Kimtai
Director General KALRO, Dr. Eliud Kireger
President, International Rangeland Congress, Prof. Dana Kelly
Chairperson, International Grassland Congress, Prof. Ray Smith
Ladies and Gentlemen

Agriculture is essential for sub-Saharan Africa's growth and for achieving the sustainable development goals particularly ending hunger, achieving food security, improving nutrition and reducing poverty. The Agricultural Sector Transformation and Growth Strategy 2019 -2029 (ASTGS) addresses the challenges in the agricultural sector and recognizes that the sector can contribute significantly to the 10 percent annual economic growth that is envisaged under the economic pillar of Vision 2030. Presently, however, agricultural production is negatively affected by constraints and changing factors that include: unsustainable land and environment management practices. The Government of Kenya recognizes the important role agricultural technology development and application can play in transforming and modernizing agriculture. Adoption of agricultural technologies and innovations can lead to increased productivity and quality along agricultural value chains. The Department particularly wants to associate with

The International Rangeland Congress and Grassland Congress with an aim of;

- Bringing to the fore the role of public and private partnerships in improving grassland/ rangeland resources and their derived livelihoods, particularly for pastoral people; and
- Enhancing sustainability of grassland and rangeland against adverse climate change.

Our direct equivalence to the two objectives, the ministry is implementing Kenya Climate Smart Agriculture Project (KCSAP), which among other areas, supports collaborative research programs to develop technologies, innovations and management practices for climate smart crops, livestock, aquaculture, land, water, agro-forestry, sustainable bio-energy and socio-economic research. The objectives are in the three wins: increased productivity, incomes and reduced Green House Gases (GHG). Implementation of this project is multi-sectoral, bringing communities, county extension service and research along specific value chains, identified by counties as priority areas. Specific projects already supported under the project are: Pigeon-pea technologies, innovations, management practices for enhancing productivity, food and nutrition

security of smallholder communities in Kenya; Digital Dairy – ICT advisory to realize the forage triple win Validate and promote grass based diets for low enteric methane emissions for finishing steers, Evaluating input and output market systems for CSA finger millet in various Counties in Kenya among others.

Ladies and Gentlemen

National Agricultural Research System (NARS) Policy 2012 was formulated for the sector and has been implemented since 2013. Other legal instruments for agricultural research include, Technology and Innovation Act 2013; the Kenya Agricultural and Livestock Research (KALR) Act 2013; as well as the Universities Act of 2012. The National Agricultural Research System Policy is under review and seeks to streamline, rationalize and put in place a system that is consultative, efficient and effective and one that takes into account economies of scale to not only use the current scientific, human and physical capacities but also position Kenya as a hub for agricultural research, innovations and knowledge base in the region.

Within these broad priorities there were two priority research programs, namely, conservation of resources, which includes national soil/water management, farming systems research in dry land areas, livestock systems in pastoral areas and the generation and application of improved technologies in major agricultural zones. The second one was on crop and livestock research. This included breeding of improved varieties of major crops and vegetables and breeds of livestock, animal nutrition and veterinary research in areas of epidemic diseases and parasites. It is expected that the reform process prompted by the policy will be harmonized and mainstreamed into the transformational processes that are taking place in the fields of agricultural education, training and extension, as well as in other scientific fields for the realization of the Government's Big Four agenda on 100% food and nutrition security, and the Agricultural Sector Transformation and Growth Strategy (ASTGS), 2019 - 2029.

Despite past and ongoing initiatives, the East Africa region lacks strong policies to support implementation of the necessary climate change adaptation strategies so far researched. Some of the existing policies and frameworks, such as the East African Community Climate Change Policy (EACCCP), are not yet felt at the grassroots.

Ladies and Gentlemen

Crop-livestock integration one of management strategies that contributes to nutrient cycling that leads to sustainable productions systems. Vast amounts of crop residues available after grain harvesting become an important source of livestock feed especially during the dry seasons, while manure from livestock form organic fertilizer for crop production. It is common to see these crop residues being transported to grassland and even rangeland for livestock feeding during drought. Manure is in turn transported from grassland and rangeland to improve soil fertility and structure in crop lands. This system when managed efficiently can contribute significantly to sustainable grassland and rangeland productivity. It is my hope and believe that during this joint Congress information sharing on crop-livestock integration shall be explored for overall Agricultural productivity and improved livelihood.

I wish to take this opportunity to wish all delegates fruitful deliberations and say, we look forward to your input into our research programs and policies that shall make global agriculture responsive to the theme: 'Sustainable use of the Grassland and Rangeland for Improved Livelihoods'.

THANK YOU!

ANNEX 5: OPENING REMARKS BY DR. DANA KELLY, PRESIDENT OF CONTINUING COMMITTEE OF THE INTERNATIONAL RANGELAND CONGRESS

Welcome to the Joint International Grassland & International Rangelands Congress, hosted by Kenya. This is the first time there has been a joint international Grassland & Rangeland Congress in Africa. So, this congress is a significant moment in the history for both our organisations (the International Rangelands Continuing Committee and the International Grasslands Continuing Committee).

Rangelands and grasslands are important to the world, as these regions cover about half of the earth's land surface area. We have rangelands and grasslands across the world: in much of Africa, in the Arctic, Australasia, Central Asia and Mongolia, eastern and southern Asia, the Middle East, North America, South American, the Caribbean, and even in Europe.

The health of these landscapes are critical to the wellbeing of more than 500 million people, some of the most marginalised people's of the world. Pastoralists and others who derive their livelihoods from rangelands are both users and stewards of the land. Their stewardship is critical for building resilient economies, achieving food and water security, and improving environmental conditions. In Africa, rangelands and grasslands occupy almost half of the continents inhabited surface, and are home to 40 per cent of continent's population. These regions support an estimated 50 million pastoralists and up to 200 million agropastoralists. However, many forces threaten the productivity and ecological integrity of these lands and their caretakers.

Rangeland degradation world-wide is a significant issue. Misunderstanding of rangelands is widespread; a common conception is that these lands are wastelands with little value, which need to be repaired, improved, or developed. This problematic notion of rangelands informs policies which are implemented in rangeland regions in many countries. The lack of understanding about complexities and regional nuances in rangeland means that the pastoralists who live here, have ended up as some of most marginalised and disadvantaged people in the world.

One initiative that will help overcome this lack of understanding is the proposal for an International Year of Rangelands and Pastoralists (IYRP), which has been proposal by Mongolian Government. While economic, social and institutional issues of rangelands are beginning to be recognised in some parts of the world, rangelands and pastoralists are often not a major consideration in government policy around the world. The proposed International Year of Rangelands and Pastoralists is an opportunity to promote messages about the importance of pastoralists.

The United Nations decision about whether or not an IYRP will happen, is likely to occur later this year. Please use your networks to encourage the government in your countries to support the IYRP – not only the Departments of Agriculture, also Departments for the Environment, forests and range management, and Departments of Foreign Affairs. Many of you may have contacts in pastoralists organisations, scientific and research organisations – all of these organisations can write and support the IYRP.

I would like to call on people around the world to step up. We need individual, communities, organisations and governments to support an IYRP.

This Congress will also increase our understanding of rangelands and grasslands. It is appropriate that this Congress is in Kenya – rangelands and grasslands are particularly important here, comprising 80% of this beautiful country, and are home to about 10 million people. These regions support 70% of the national livestock population and 90% of the wildlife, which is key to the tourism industry. There is a strong history of scientific research.

The Kenyans are bringing us a **very exciting** Program! The theme of the Congress is “*Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods*”, which is particularly topical at the moment. Much of Kenya is currently facing drought as the short rains are late, on top of previous dry seasons. Other countries in East Africa are in a similar position, with a *La Nina* weather pattern causing low rainfall. Government policies and funding are needed to support pastoralists in the short term, and strategies are needed to improve livelihoods in the rangelands in the longer term.

One of the seven themes at this Congress focuses on “Drought management and climate change”. Other themes focus on livestock, forage production as well as social and institutional issues. At this congress, the combined “people” related themes have one the largest number of papers (with about 60 papers). Ecological aspects of rangelands and grasslands also feature strongly (with about 40 papers). The balance of disciplines represented in presentations has changed over the years. The focus is more interdisciplinary, with a wider scope of topics now than 10 years ago.

The presentations, panel sessions and videos provide insights from both scientist’s perspectives, and importantly, insights from pastoralist’s perspectives. I am delighted that we have pastoralists from rural Kenya talking in Plenary sessions. It is not common that pastoralists present their views at an international rangelands and grassland congress. We tend to hear more from scientists at these congresses, yet it is vital that we hear from the people who **actually manage** our rangelands and grasslands. Congratulations to the organising committees for bringing us these different perspectives about rangelands and grasslands.

This congress is all virtual, another first for both the IGC and IRC. We all certainly wish we were able to meet face-to-face. We appreciate the time zone challenges of the online format; and thank those of you who are getting up very early or staying up very late. One of the benefits is that this format does allow people from remote villages to join in, some of these people would not be able to attend an international congress in person.

Welcome to all of you, to people from all over the world. I hope that you enjoy the exchange of ideas and find something of particular interest to you in this excellent program!

ANNEX 6: CLOSING REMARKS BY DR. ELIUD KIREGER, DIRECTOR GENERAL KALRO



CLOSING REMARKS BY DR. ELIUD KIREGER, DIRECTOR GENERAL (DG), KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION (KALRO), NAIROBI, KENYA

The CS, Ministry of Agriculture, Livestock, Fisheries and Cooperatives
The PS State Department of Crop production and Agricultural Research
The PS State Department of Livestock
The Chairperson International Grassland Congress Continuing Committee
The President of International Rangeland Congress Continuing Committee
Distinguished Delegates
Ladies and Gentlemen

Livestock and human population are rising in the rangeland as frequent droughts and floods are causing death of livestock and human lives in many tropical regions. Increasing productivity in these regions in order to sustain these populations, is to be done while at the same time reducing degradation. In order to effectively contribute to the growth of the agriculture sector, KALRO (established through Kenya Agricultural and Livestock Research (KALR) Act 2013) works in the rangeland and grassland to develop technologies, innovations and management practices that aims to increase productivity and reduce degradation.

Ladies and Gentlemen

The rising livestock populations, increased settlement and degradation has affected the livestock feed security, mainly grass and forage based sources. Kenya has a long history of grassland/ rangeland research and development in East Africa, dating back to early 19th Century, culminating in the setting up of the Grassland Research Station in Kitale in 1950s. Many of the grass species developed in this station have found their way to other tropical countries such as Brazil and Australia where they have been greatly improved making those countries leading beef producers globally. The KALRO is now implementing a programme to repatriate some of these forages back to Kenya to boost the livestock industry.

During the launch of the African Green Revolution Forum (AGRF) of 2021 Conference, the president went ahead and declared drought as a national disaster in Kenya. In order to deal with the perennial feed shortages, KALRO has introduced, through its Arid and Rangeland Research Institute (ARLRI), a re-seeding program, where grasses, mainly indigenous and introduced, are used to improve the rangeland. The Institute has enabled farmers to produce enough grass for their livestock, stock more in form of hay and sell to other farmers. In the coastal lowlands and highlands, which are currently experiencing droughts, *Brachiaria* grass has been introduced.

The resilient grasses sequester carbon and have an additional benefit of reducing greenhouse gases.

Ladies and Gentlemen

Today, we in KALRO have adopted the ‘Climate Smart Agriculture Strategy, 2017-2026’ in developing technologies, innovations and management practices. Technologies we develop are climate smart, in order to sustainability increase income and productivity. The theme of the Congress “Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods” therefore share KALRO’s desire to build resilience and increased agricultural productivity and improving livelihoods of the people living within the rangeland and grassland.

Ladies and Gentlemen

Ensuring food and nutrition security in the region depends not only on improved forages and animal breeds, but also on education of the communities and having vibrant seed systems. In partnership with private sector, including mass media, KALRO has repackaged knowledge from research and delivered to farmers directly on print, TV or radio media or through county extension service. In terms of providing quality forage seed KALRO, works with farmers and the Kenya Plant Health Inspectorate Services (KEPHIS) to produce seed to enable farmers establish own pastures. KALRO is also a major source of superior animal breeds, for example Boran and Sahiwal bulls and superior camel breeds for the very arid rangeland.

Ladies and Gentlemen

The unpredictable weather is still a challenge and KALRO, working with Kenya Meteorological Department (KMD), has introduced ICT based advisories, which not only give weather predictions, but have components on existing markets for livestock products. Among them is the Kenya Agricultural Observatory Platform (KAOP).

Finally, KALRO has had the privilege of being part of the organizing team for the congress, and offers to participate by sharing its experiences, beliefs and approaches to tackle adverse effects of climate change the productivity of grassland and rangeland in Kenya.

THANK YOU

ANNEX 7: CLOSING REMARKS BY PROF. RAY SMITH, CHAIR OF CONTINUING COMMITTEE OF THE INTERNATIONAL GRASSLAND CONGRESS

I want to start by highlighting two significant accomplishments of the IGC Continuing Committee during the last two years. As you all know, the IGC and the IRC Proceedings are a permanent record, a permanent legacy of research in grasslands and rangelands. They will outlive us all. Now, not only are past Proceedings available through libraries around the world, but we have the past five Proceedings available as a searchable database. Anyone around the world can simply google an author's name, and keywords from one of their Proceedings papers and the paper will be available for viewing or downloading. If this simple search does not work, then add International Grasslands (or International Rangelands for the Joint Congresses). A record of the number of downloads will also be provided for author's vitas. The International Grasslands Congress recently obtained copyright permission from Wageningen Academic Publishers for the XX IGC in Ireland (2005) to be included in the searchable database, previously this Proceedings could only be purchased as a hard copy or e-book. The Proceedings site has been developed by the University of Kentucky library system, hence the name UKnowledge. To reach the main site go to internationalgrasslands.org under click on publications or google International Grassland Proceedings. We are working towards all the Proceedings being on this site in coming years, even translated copies of the first two Proceedings which are in German.

A comprehensive IGC history was released in early 2021 "The History of the International Grassland Congress - 1927 to 2020". The IGC Congresses began with an invitation letter that Dr. Friedrich Falke sent to 50 grassland scientists in mainland Europe and the subsequent gathering and tour for 16 of these scientists in Germany in 1927. There are many details from these early years of IGC that we would not know without the publication of this history. The history includes information from every IGC Congress and other significant events in grassland research during the last 93 years. Many supplemental documents are also included in the appendix including short biographies of the six most influential men during the first 20 years including: Dr. Falke (Germany), Dr. Anders Elofson (Sweden), Professor Albert Volkart (Switzerland), Sir R. George Stapledon (United Kingdom), Dr. ir. Derek Siewert Huizinga (Netherlands), and Professor Richard Geith (Germany).

The history began as an idea by Dr. Garry Lacefield (USA) and myself soon after the XXIII IGC in India. We felt like an update and expansion of the IGC History by Dr. Ross Humphries in the late 1990's was in order. Dr. Lacefield talked with Dr. Vivien Allen about working with us on the history, based on her long-term connection with IGC including serving as Chair of the Continuing Committee from 2001-2005. She also chaired the International Forage and Grazing Terminology Committee that published *An International Terminology for Grazing Lands and Grazing Animals* in 2011. This was a collaborative effort with both the International Grassland Congress and the International Rangeland Congress. Dr. Allen began to discuss details of the IGC history with Dr. Roger Wilkins (UK) who played a prominent role in writing the initial IGC Constitution in 1978 and the revised version in 2001. As the months passed, Drs. Allen and Wilkins became the primary authors of the history and used their many worldwide grassland contacts to source information that would have been unavailable to the average IGC member. The resulting almost 400 page book is a compelling read to anyone interested in grasslands. It can be ordered from the IGC website (internationalgrassland.org) as a hard copy book or downloaded as a pdf document.

As I stand here in Kenya today, I want to say that one of the highlights of my professional career has been working with such an outstanding group of scientists, administrators, and staff at KALRO (Kenyan Agricultural & Livestock Research Organization), at the Kenyan Ministry of Agriculture, Livestock, Fisheries and Cooperatives, and other organizations in Nairobi. They have been patient with me ever since my first Congress planning visit in 2016. They have been patient as I mispronounced their names. They have been patient as I broke nearly every formal meeting protocol, often breaking in when chairs of committees had the floor. I'm sure if I was Kenyan, I would have been demoted. But they just smiled and nodded their heads and gave me the floor.

I flew into the country at least every year either on my own, or with Dana Kelly (IRC Chair), Jim O'Rourke (IRC Secretariat), and once with Derek Woodfield from the IGC Continuing Committee. We expected them to break away from their many job responsibilities for several weeks before and after our visits. And, to my knowledge, none were paid more than their regular salary. But they were expected to do more. And to a man and to a woman they rose to the occasion. Thank-you.

This Congress in Kenya all started with Dr. David Miano and his leadership as chair of the IGC Continuing Committee after the IGC Congress in Sydney, Australia in 2013. He showed vision and leadership in working with colleagues to bid for the Congress to be held in Africa for the first time. David initiated gathering together his colleagues at KALRO. He organized the team that came to the IGC Congress in India to accept the bid. He then helped spearhead the effort to develop a bid for the International Rangeland Congress and brought a delegation to Saskatoon Saskatchewan Canada in 2016 to present the bid that this be a Joint Congress. Thank-you David. It's been an honor to succeed you.

There are many, many people I'd like to thank, on behalf of myself and Dana Kelly. We have worked with 3 Principal Secretaries of Livestock, but the longest with Harry Kimtai, chair of National Organizing Committee (the NOC) Principal Secretary State Department for Livestock. He personally led most of our 15 NOC meetings. He always made us feel welcomed each time we visited with him in his office. Thank you.

We'd like to thank the Director General of KALRO Dr Eliud Kireger, Vice Chair of the National Organizing Committee for his support of a joint Congress. I remember the first time we met in February 2016. I was very nervous as I entered his office, trying to remember the protocol I had been told to follow.

Both of these men made the extraordinary effort to accompany the Kenyan delegation to the Society of Range Management meetings in Denver CO in February 2019. They participated in the meetings and manned the Congress booth. And they joined with us as we cheered on Dr Ernest Bogo when he dressed as a Swahili warrior with a tall Gallagher fencepost as a spear. I assume the airlines wouldn't permit a real spear. Little did we know that Covid would soon devastate the world. But they stayed committed and supported the Congress during these tumultuous and unpredictable times.

We'd like to thank the government of Kenya for their tremendous financial support. Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries and Cooperatives, the Hon. Peter Munya gave his full support for the Congress.

We want to give a special thanks to Dr Joseph Mureithi, Deputy Director General (Livestock) for KALRO and the Chair of the Secretariat for the Congress. He gave much of the administrative oversight for the activities of the secretariat. Over all these years, Dr. Mureithi has provided great foresight and leadership. He also attended to many tasks large and small, even personally lining up drivers to pick us up from the airport. He is now a close friend. Thank-you Joseph. And my invitation to host you and your wife Grace in our home in Kentucky in 2023 is very genuine.

We want to thank Dr Elkana Nyambati, the secretary of the Secretariat for his key involvement with all of the Congress committees. When we would head back from Kenya after one of our week-long trips, we would both get emails from Elkana late at night as he followed up on all the tasks that we had come up with during our visits. Thank-you Elkana.

We want to give a special thank-you to Primrose (Nabwire). She was the wheel that kept everything running. From receiving and distributing proceedings papers to reviewers, to handling registrations, to recording and typing meeting minutes, to calling the PS's office to line up meetings, and about a million things more. You may think I'm exaggerating but I'll bet if you count all the emails that Primrose has answered during the last few years, it would add up to a million (or at least several hundred thousand).

There are so many others to thank. Especially the leadership of the Secretariat. Thank you, Florida Maritim for chairing the publicity committee and Stephen Odipo for being the secretary. You both worked long hours for this Congress, especially in the last months. Thank you, Simon Onchiri for chairing the local arrangements committee and Cecilia (Onyango) for being the Vice-chair. Thank you Elkana for serving as secretary to this committee. You all worked so hard lining up the Congress venue, hotels, and all the other aspects for a physical meeting, and then you had to shift gears and line up details for a virtual Congress.

Thank you Patrick Watete for chairing the tour committee, Oliver (Wasonga) for serving as co-chair, and Michael Okoti for being the secretary. You spent many long hours planning and conducting reconnaissance trips for some amazing pre- and mid-Congress tours around Kenya and even to Tanzania. I know that Dana and Jim really enjoyed their reconnaissance trip south into Tanzania, and we wish we had been able to run this for Congress. More recently you worked with Stephen and others to develop virtual tours. Thank-you.

We want to thank Patrick (Ngicuru) for serving as chair of the finance committee and Festus (Murithi) for serving as secretary. This was a critical role you played, and you both showed diligence with the many permutations of the budget and the paperwork involved. And thank you George (Keya) for chairing the fundraising committee and Alice for serving as secretary. We want to give a special thank-you to Professor Moses (Nyangito) for chairing the publications committee, Dereje (Wakjira) and Lance (Robinson) for serving as co-chairs, and to Jane (Wamuongo) for serving as secretary. Lance, thanks for your commitment for working so diligently with the committee even after moving back to Canada from Kenya. You and the entire team handled 1000 abstracts and arranged for each one to be reviewed. Then you fielded over 600 full-length paper submissions and had all of them reviewed and some re-reviewed. Then you worked with the program committee to make sure all of this would fit into a program.

And we want to give an extra thank-you to Professor Jesse Njoka for so capably chairing the program committee and An Notenbaert for serving as co-chair. Professor, you put in so much

effort on the initiative for a Traditional Knowledge Forum. The forum may not have been held at this Congress but the groundwork that you and Dana laid sets a valuable foundation for it to be held at future Congresses. Thank you Foustine Wandera for serving as secretary of the program committee. And serve you did. I know you had many late, late nights working on the 3rd, 4th, 5th,10th versions of the program. In-person, hybrid, in-person, virtual, maybe hybrid, and then finally virtual. Thank you.

Thank you Caroline for helping in recent months and Protel for the tremendous work you did over the last few weeks and especially the last few days. We also want to thank all those that were heavily involved early on and have since retired or moved on to other positions. Thank you all.

You'll notice I used many first names. This is not the professional protocol in Kenya, but I was very deliberate in doing this to show the close working relationship Dana and I have had with all of these individuals over the last 5 years. I'll make sure to add last names to my written transcript that has the permanent proceedings, but to me, I'll always think of you fondly by your first names.

We want to thank Dr. Jim O'Rourke, permanent secretariat of the International Rangeland Congress. He has been the backbone of the IRC organization for years, going back to 1978 when he was one of those who helped start the International Rangeland Congress. He started his official duties with IRC in 1995 as a member of the continuing committee, then as President of the Continuing Committee and now as secretariat. Jim, it has been great working together all these years and I have fond memories of Dana, Stephanie and I sitting with you at the Jacarada hotel with your Tusker beer in hand and sharing stories of being a young range scientist in Tanzania and all your adventures during those years. Even driving all the way to Nairobi for groceries. And most of all Jim, thank-you for raising the majority of the outside sponsorship that allowed so many delegates to attend this virtual Congress at no charge. And I thank-you on behalf of all those attending right now because of you.

I have several more thank-you's. A huge thank-you to Dana Kelly. Officially, Dana and I share the same position leading our Continuing Committee. She as President of the IRC Continuing Committee and me as Chair of the IGC Continuing Committee. But that's just the surface. Dana, it has been a pleasure and a joy working with you over the last 5 years. I've seen you show grace and leadership, even under tremendous pressure. I've seen you show extreme politeness and I've seen you show forcefulness when necessary. I have seen you provide incredible vision for IRC over the years and leadership for initiatives like the International Year of Rangeland and Pastoralists. I have so appreciated working with you professionally, but even more knowing you as a dear friend to Stephanie and I. Thank-you Dana.

And a special thank-you to my wife Stephanie. We have been married 38 years and have 4 grown children and now 7 grandchildren. You stood by my side through grad school and 30 years of a very demanding professional career. And little did you know when we were in India and I told you I'd been nominated to chair IGC that it meant working double and triple overtime from my day job at the University of Kentucky. Thank-you Stephanie. Thank you also to Dana's husband, Mark, as he has supported her work on the Congress over the years.

Now, speaking to all of my Kenyan colleagues and friends who are sitting in front of me (Note: the NOC secretariat met in person in Mombasa during the week of the Congress). There have

been profound changes in our world during the last two years, but you have and are rising above. Covid will not defeat you or any of us, just as the IGC leadership resurrected the organization after a 12-year break during and after WWII. You have risen to confront these formidable challenges and have overcome. Sure, you are disappointed not to be hosting delegates in-person in Kenya to experience the people, the culture, the vast and beautiful grasslands and rangelands. But you have given them a taste, an introduction, and reason to visit and spend time here in the future. And you have continued the legacy of both the IRC and the IGC. You have provided the platform for this Congress, the recorded presentations that are now available to all delegates and the permanent proceedings papers that will be available for generations of scientists. And although this Congress was virtual you have still helped create very real and lasting interactions between researchers from many countries. Thank-you. Asante-sana.

Lastly, Dana and I want to thank all of you around the globe. Thank-you for your perseverance and patience with the postponement of the congress, with delays, with extensions, with communication issues. Thank-you for sticking with us and helping move all of us forward toward even greater significance in our profession fields, influence on policy, and most significantly in our efforts to improve the lives of those residing on the rangelands and grasslands of the world. Thank-you.

ANNEX 8: CLOSING REMARKS BY MR. HARRY KIMTAI, PRINCIPAL SECRETARY



CLOSING REMARKS BY MR. HARRY KIMTAI, PRINCIPAL SSECRETARY (PS), STATE DEPARTMENT FOR LIVESTOCK (SDL), MINISTRY OF AGRICULTURE, LIVESTOCK, FISHERIES AND COOPERATIVES (MALFC), NAIROBI, KENYA

President, International Rangeland Congress Continuing Committee, Prof. Dana Kelly
Chairperson, International Grassland Congress Continuing Committee, Prof. Ray Smith
Director General, KALRO, Dr. Eliud Kireger
Distinguished Delegates
Ladies and Gentlemen

The 24th International Grassland and 11th International Rangeland Joint Congress, the first-ever joint Congress to be hosted in Africa and first IGC-IRC virtual congress, is coming to a close. This Congress was set to do three things:

- (i). Bring out and discuss key issues affecting global grassland and rangeland resources;
- (ii). Propose interventions, resolutions and guidelines on how to address food and nutrition security challenges arising from use of world grassland and rangeland production systems; and
- (iii). Bring to the fore the role of public and private partnerships in improving global grassland/ rangeland resources and their derived livelihoods, particularly for pastoral people.

Ladies and Gentlemen

This Congress was conducted through plenary concurrent sessions, and also panel discussions in order to enable scientists, practitioners and policy makers participate and contribute to the matters in their hands. We had sessions on Range/grassland ecology; forage production and utilization; livestock production system; wildlife and tourism; biodiversity, ecosystem services and ranching; incorporating education in building capacity of the pastoralists to manage rangeland/grassland; among others.

The Continuing Committees of the International Rangeland and International Grassland Congresses, entrusted Kenya to host the joint congress and we are indeed grateful. Their decision is justified by the high level of participation witnessed in the Congress and to the many very fruitful discussions that were held and the resolutions reached. I believe, if the resolutions are adopted, we shall have sustainable Rangeland and Grassland where livestock, wildlife and pastoralists co-exist in complex inter-relationships that finally will give rise to economically vibrant ecosystems.

Ladies and Gentlemen

Kenya and the horn of Africa is currently facing severe drought which is attributed to the effects of global climate changes. The region has keenly followed the proceedings of the Congress and is eagerly waiting to receive the formal proceedings to tease out potential lessons and solutions that can assist cope with the effects of climate change. Such lessons will also include those on improving pastoralists' way of life and on addressing environmental degradation. Specifically, based on those lessons, national policies and strategies will be revised to sustainably develop and utilize grassland and rangeland in order to contribute to our national economies.

The Kenyan Government is more than ready to support our researchers to continually promote the interchange of scientific and technical information, create awareness on all aspects of grassland and rangeland in Kenya, working together with other countries. I want to believe that this scientific research will not only be an exchange of information between the researchers alone, but will improve sustainable utilization of the rangeland and grassland for improved livelihood and welfare of the wildlife not only in Kenya but also contribute to improvement all over the world. We therefore need to create a lot of awareness along those lines.

Ladies and Gentlemen

As we draw the curtain on this year's Congress, may I offer my gratitude first to the office of the Cabinet Secretary, Ministry of Agriculture, Livestock, Fisheries and Cooperatives under Hon. Peter Munya for its support towards the successful organization of the Congress. Secondly may I thank my colleague Prof. Hamadi Boga, PS State Department of Crops and Agricultural Research; Director General, Kenya Agricultural and Livestock Research Organization, Dr. Eliud Kireger, the President of the International Rangeland Continuing Committee, Prof. Dana Kelly and Chairman of International Grassland Congress Continuing Committee, Prof. Ray Smith.

I also wish to thank the entire membership of National Organizing Committee and the NOC Secretariat for working tirelessly to make this congress a resounding success under very challenging conditions of the global COVID 19 pandemic. I thank all those who submitted oral papers, posters, virtual exhibitions and all those who participated in plenary sessions.

Finally, I thank all the sponsors who supported this Congress. I am encouraged that as we bring this congress to a close that there is great hope for "Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods", which was the theme of the Joint Congress. I now wish to declare this Congress officially closed.

ASANTE SANA!!!

ANNEX 9: JOINT IGC/IRC CONGRESS PROGRAM

JOINT IGC/IRC CONGRESS PROGRAM

25TH – 29TH OCTOBER, 2021

October 25th, 2021

WELCOME REMARKS	PLENARY HALL (DAY 1) (LIVE)
12:40 – 12:45 pm EAT	Introductory remarks by Eliud Kireger - Director KALRO and Chairman to NOC Secretariat
12:45 – 12:50 pm EAT	Remarks by Harry Kintai – PS Min of Agriculture, Livestock, Fisheries and Cooperatives (KENYA) and Chairperson of National Organizing Committee
12:50 – 12:55 pm EAT	Remarks by Dana Kelly – President IRC Continuing Committee
12:55 – 1:00 pm EAT	Remarks by Ray Smith – Chairperson IGC Continuing Committee
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 1 (DAY 1)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Remote sensing, risk analysis and land management
1:00 – 1:05	Introduction by Chairperson, FRAVAL Simon
1:05 – 1:20 Oral 1	Rangeland vegetation mapping at pixel level, a new approach of map making. A case study in the Maasai Mara rangeland in Narok District, SW Kenya. (<i>Presenter Bert Toxopeus</i>)
1:20 – 1:35 Oral 2	Development of models for simulation of available forage biomass in the native vegetation of the Brazilian semiarid through remote sensing (<i>Presenter Magno José Duarte Cândido</i>)
1:35 – 1:50 Oral 3	Lowveld savanna bush cutting alters tree-grass interactions (<i>Presenter Emily Wedel</i>)
1:50 – 2:05 Oral 4	Multifunctionality of sown grassland is enhanced by combining four complementary species (<i>Presenter Matthias Suter</i>)
2:05 – 2:20 Oral 5	Effects of Herding on Rangeland Use Efficiency in Kenya (<i>Presenter Anna Seidel</i>)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 2 (DAY 1)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Temperate/Tropical Transition Climate Zones: Locations for Breeding Forages with Climate Resiliency
1:00 – 1:05	Introduction by Chairperson, Kenneth H. Quesenberry

1:05 – 1:20 Oral 1	Temperate/Tropical Zones: A Hotspot for Identifying and Breeding Forages with Climate Resiliency (<i>Presenter Kenneth Quesenberry</i>)
1:20 – 1:35 Oral 2	Breeding Forage Annual Ryegrass at the University of Florida (<i>Presenter Kevin Kenworthy</i>)
1:35 – 1:50 Oral 3	Moving warm-season forage Bermuda grass (<i>Cynodon</i> sp.) into temperate regions of North America. (<i>Presenter William Anderson</i>)
1:50 – 2:05 Oral 4	Breeding perennial warm-season grasses for the subtropical belt in South America (<i>Presenter Carlos Acuña</i>)
2:05 – 2:20 Oral 5	Warm-season legumes – Challenges and constraints to adapting warm-season legumes to transition zone climates with examples from <i>Arachis</i> (<i>Presenter Dr Jose Dubeux</i>)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 3 (DAY 1)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Recent advances in <i>Urochloa</i> grass research in Kenya
1:00 – 1:05	Introduction by Chairperson, Donald Njarui
1:05 – 1:20 Oral 1	Growth and Yield Evaluation of <i>Urochloa</i> Grass Cultivars in Sub-humid region of Kenya (<i>Presenter Mary Njeri Kifuko-Koech</i>)
1:20 – 1:35 Oral 2	Milk yield of dairy cattle fed <i>Urochloa</i> grass cultivars in Kenya (<i>Presenter Michael Njunie</i>)
1:35 – 1:50 Oral 3	Productivity and nutritive value of <i>Urochloa</i> grass cultivars in semi-arid Kenya (<i>Presenter Donald Njarui</i>)
1:50 – 2:05 Oral 4	Soil microbial Carbon, Nitrogen and Phosphorus dynamics in <i>Brachiaria</i> cultivated in sub humid regions of western Kenya (<i>Presenter Keziah Ndungu-Magiroi</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 4 (DAY 1)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Beef and Dairy Production Systems
1:00 – 1:05	Introduction by Chairperson, Iain Wright
1:05 – 1:20 Oral 1	Comparing management strategies for enhanced beef production on suckler cow farms (<i>Presenter Leif Jarle Asheim</i>)
1:20 – 1:35 Oral 2	Progardes Desmanthus: good for beef, good for the environment (<i>Presenter Chris Gardiner</i>)
1:35 – 1:50 Oral 3	Bee-Friendly Beef: Developing Biodiverse Pastures to Increase Ecosystem Services (<i>Presenter Benjamin Tracy</i>)
1:50 – 2:05 Oral 4	What are the main limits to livestock production in the tropics – according to farmers? (<i>Presenter Alan J Duncan</i>)
2:05 – 2:35	General Discussion

2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 5 (DAY 1)
Theme	4. WILDLIFE, TOURISM AND MULTI-FACETS OF RANGE-LAND/GRASSLAND
Topic	Biodiversity, Ecosystem services and Ranching
1:00 – 1:05	Introduction by Chairperson, Charles Musyoki
1:05 – 1:20 Oral 1	Brazilian Pampa Rangeland: Challenges in the face of soybean expansion (<i>Presenter Juliana Gomes Moreira</i>)
1:20 – 1:35 Oral 2	The new tendencies of assessment of environmental impact of livestock production: a road testing of LEAP/FAO Biodiversity Assessment Guidelines in pastoral systems in Uruguay (<i>Presenter Fernanda De Santiago</i>)
1:35 – 1:50 Oral 3	Comparing empirical with perceived trends in wildlife, livestock, human population and settlement numbers in pastoral systems: The Greater Maasai Mara Ecosystem, Kenya (<i>Presenter Juliet Kariuki</i>)
1:50 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 6 (DAY 1)
Theme	5. DROUGHT MANAGEMENT AND CLIMATE CHANGE IN RANGELAND/GRASSLAND
Topic	Land use, Carbon Sequestration and GHG fluxes
1:00 – 1:05	Introduction by Chairperson, Birthe Paul
1:05 – 1:20 Oral 1	Exploring water use and carbon dynamics of the indigenous Zambezi teak (<i>Baikiaea plurijuga</i>) at Sukume forestry reserve, Zimbabwe (<i>Presenter Onalenna Gwate</i>)
1:20 – 1:35 Oral 2	Long-term N addition, not warming, increases net ecosystem CO ₂ exchange in a desert steppe in northern China (<i>Presenter Guodong Han</i>)
1:35 – 1:50 Oral 3	Quantifying on-farm greenhouse gas emissions in smallholder livestock systems in Western Kenya: cradle to farm gate life cycle assessment (<i>Presenter Phyllis Ndung'u</i>)
1:50 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 7 (DAY 1)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Changes in rangeland property rights and land use in Central Asia and western China
1:00 – 1:05	Introduction by Chairperson Carol Kerven

1:05 – 1:20 Oral 1	Community- and User-based pasture management in Kyrgyzstan: Recent trends, achievements, and challenges (<i>Presenter Andrei Doerre</i>)
1:20 – 1:35 Oral 2	Rangeland management changes in the process of pastoral urbanization on the Qinghai-Tibet Plateau, China (<i>Presenter Gongbu Zeren</i>)
1:35 – 1:50 Oral 3	Obstacles to the revival of mobile grazing systems in Kazakhstan (<i>Presenter Sarah Robinson</i>)
1:50 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 1, 1:00 – 2:35 pm (EAT)	Room 8 (DAY 1)
Theme	7. CAPACITY, INSTITUTIONS AND INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN RANGELAND/GRASSLAND
Topic	Participatory socio-ecological observatories for sustainable rangeland development
1:00 -1:05	Introduction by Chairperson, Elisabeth Huber-Sannwald
1:05 – 1:20 Oral 1	Drylands Participatory Observatories: a new socio-ecological technology to co-produce knowledge and science to develop policies for sustainable development (<i>Presenter Natalia Martínez Tagüeña</i>)
1:20 – 1:35 Oral 2	Long-term socio-ecological research in the Biosphere Reserve in Mapimi, Mexico – a multidimensional participatory monitor of rangeland/pastoral systems (<i>Presenter Víctor Manuel Reyes Gómez</i>)
1:35 – 1:50 Oral 3	Network of transdisciplinary observation mechanisms as digital sources of knowledge on the rangeland, to communicate/exchange at local, regional and global scales (<i>Presenter Alessandro Rizzo</i>)
1:50 – 2:05 Oral 4	Participatory management of rangeland hydrology – a new socio-ecological technology to effectively adapt to and mitigate climate change: case from Morocco (<i>Presenter Lhoussaine Bouchaou</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
OPENING SESSION, AND KEYNOTES 2:45 – 4:50 pm (EAT)	Plenary Hall (DAY 1) (LIVE)
2:45 – 2:50	Introduction by Chairperson, Harry Kimtai
2:50 – 3:20	OFFICIAL OPENING – Hon Peter G. Munya (EGH)
3:20 – 3:40	KEYNOTE 1 – <i>Sustainable use of Rangeland Resources for Improved Livelihoods</i> Dr. Kathrine Johnsen – Norwegian Institute for Water Research (NIVA)

3:40 – 4:00	KEYNOTE 2 – <i>Sustainable use of Grassland Resources for Improved Livelihoods</i> Dr. Liana Jank – Embrapa Beef Cattle Brazilian Enterprise for Agricultural Research
4:00 – 4:20	THEME KEYNOTE 1 - <i>Capacity, Institutions and Innovations for sustainable development in Rangeland/Grassland</i> Dr. Jonathan DAVIES - Global Coordinator - Global Drylands Initiative IUCN Eastern & Southern Africa
4:20 – 4:50	General Discussion
4:50 – 5:00	HEALTH BREAK
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 1 (DAY 1)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Rangeland monitoring and support systems
5:00 – 5:05	Introduction by Chairperson, Mounir Louhaichi
5:05 – 5:20 Oral 1	Positive changes in regional vegetation cover in Patagonia shown by MARAS monitoring system (Presenter Gabriel Oliva)
5:20 – 5:35 Oral 2	Bush Expert: Decision Support System to restore the productivity of degraded rangeland in southern Africa (Presenter Klaus Kellner)
5:35 – 5:50 Oral 3	Enhanced Grazing Management Assessment Using Drone-Based Lidar Measurements (Presenter Vitalis Temu)
5:50 – 6:20	General Discussion
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 2 (DAY 1)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Rangeland degradation and restoration
5:00 – 5:05	Introduction by Chairperson, Fernando A. Ibarra Flores
5:05 – 5:17 Oral 1	C3 Perennial Grass Dominates Mixed C3/C4 Grassland after Invasion by a C3 Woody Sprouter (Presenter Caitlyn Cooper)
5:17 – 5:29 Oral 2	Characterization of Degree of Eco-restoration by Tree- Grass Interaction in Degraded lands of Semi-Arid Tropics (Presenter R V Kumar)
5:29 – 5:41 Oral 3	Counteracting green alder expansion by low-input grazing: Potential and challenges (Presenter Manuel K. Schneider)
5:41 – 5:53 Oral 4	Rangeland management in a changing world – active and passive restoration case studies from Ethiopia, Tanzania and South Africa (Presenter Anna Treydte)
5:53 – 6:05 Oral 5	Rejuvenation of rangeland – role of diversity and improvement strategies of range grasses (Presenter Ajoy Roy)
6:05 – 6:20	General Discussion
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 3 (DAY 1)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forage genetics & improvement

5:00 – 5:05	Introduction by Chairperson, Fernando Ortega-Klose
5:05 – 5:20 Oral 1	Identification and analysis of flowering time candidate genes of <i>Dactylis glomerata</i> L. (Presenter Xinquan Zhang)
5:20 – 5:35 Oral 2	BRS Quênia and BRS Tamani: new <i>Panicum maximum</i> Jacq. hybrid cultivars in Brazil (Presenter Liana Jank)
5:35 – 5:50 Oral 3	Identifying forage quality in Eastern gamagrass [<i>Tripsacum dactyloides</i> (L.) L.] genotypes from a wild regional collection (Presenter Dylan Hollowell)
5:50 – 6:20	General Discussion
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 4 (DAY 1)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Social-Economics of Livestock Production Systems
5:00 – 5:05	Introduction by Chairperson, Festus Murithi
5:05 – 5:17 Oral 1	Involving stakeholders in Crop-livestock systems analysis through Innovation Platforms: an example in Burkina Faso and Niger (West Africa) (Presenter Clarisse Umutoni)
5:17 – 5:29 Oral 2	Food security in crop, livestock and mixed farming systems in Mali (Presenter Christoph Reiber)
5:29 – 5:41 Oral 3	Why We Need a Ruminant Revolution: Malnutrition, Metabolic Illnesses and Sustainable Development (Presenter Peter Ballerstedt)
5:41 – 5:53 Oral 4	Analysis of Actors and Activities at Dagoretti Livestock Market in Nairobi City County (Presenter Walter Magero Wafula)
5:53 – 6:05 Oral 5	Livestock feed constraints in East Africa: spatialized metrics for availability and quality (Presenter FRAVAL Simon)
6:05 – 6:20	General Discussion
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 5 (DAY 1)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forages and Environment Improvement
5:00 – 5:05	Introduction by Chairperson, Solomon Mwendia
5:05 – 5:20 Oral 1	Nutrient cycling via plant litter and cattle excreta in N-fertilized grass or grass-legume pastures in North Florida (Presenter Liza Garcia)
5:20 – 5:35 Oral 2	Ranking some native grass species for veld restoration in a semi-arid region: The use of phenological and nutritional parameters. (Presenter Khuliso Ravhuhali)
5:35 – 5:50 Oral 3	Grass-legume mixtures for diversified and profitable forage production (Presenter M. Anowarul Islam)
5:50 – 6:20	General Discussion

CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 6 (DAY 1)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Securing land tenure for pastoralists as an incentive for engaging actively in the UN Decade on Ecosystem Restoration (<i>LIVE</i>)
5:00 – 5:05	Introduction by Chairpersons, Gregorio Velasco Gil and Caroline Ruto
5:05 – 5:15 Oral 1	The UN policy frameworks, resolutions and applied policies on rangeland restoration and the opportunities for stakeholders in the UN Decade on Ecosystem Restoration for rangeland ecosystems. (<i>Presenter from UNEP, Abdelkader Bensada</i>)
5:15 – 5:25 Oral 2	The possible opportunities and pathways to promote sustainable pastoralism for rangeland ecosystem restoration in the IGAD region (<i>Presenter Muchina Munyua</i>)
5:25 – 5:35 Oral 3	The role of pastoralists as users and protectors of the rangeland ecosystems, including opportunities and challenges for restoration: LDN and PRAGA methodology and case studies. (<i>Presenter Vivian Onyango</i>)
5:35 – 5:45 Oral 4	Participatory rangeland management (PRM): securing rights and increasing investments in the management of land and resources in Ethiopia and Mongolia (<i>Presenter Fiona Flintan</i>)
5:45 – 5:55 Oral 5	Building Africa's Great Green Wall - Restoring degraded drylands for stronger and more resilient communities (<i>Presenter Moctar Sacande</i>)
5:55 – 6:05 Oral 6	The opportunities and challenges for pastoralists in rangeland restoration and the IYRP: A case study of Uganda (<i>Presenter Loupa Pius</i>)
6:05 – 6:20	General Discussion
CONCURRENT SESSION 2, 5:00 – 6:20 pm (EAT)	Room 7 (DAY 1)
Theme	7. CAPACITY, INSTITUTIONS AND INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN RANGELAND/GRASSLAND
Topic	Management, Land Use Planning & Ecosystem Services
5:00 – 5:05	Introduction by Chairperson, P.K. Ghosh
5:05 – 5:17 Oral 1	Water Use Efficiency and Land Use Management Variability on Native Grassland Ranches on the Pampa Biome of Uruguay (<i>Presenter Diana Restrepo-Osorio</i>)
5:17 – 5:29 Oral 2	Revisiting the concept of the planning region in settings with dynamic spatial-temporal conditions: Lessons from land use planning in pastoral areas of Northern Kenya, Ethiopia and Tanzania (<i>Presenter Robinson Lance</i>)

5:29 – 5:41 Oral 3	Adaptive, multi-paddock, rotational grazing management: An experimental, ranch-scale assessment of effects on multiple ecosystem services (<i>Presenter David J Augustine</i>)
5:41 – 5:53 Oral 4	Scalable online scenario development tool for rangeland conservancy managers using high spatial-temporal resolution carrying capacity maps and livestock market data. (<i>Presenter Luc Boerboom</i>)
5:53 - 6:05 Oral 5	Assessing the impacts of different initiatives on the rehabilitation of pastoral and silvopastoral ecosystems : Big Data oriented approach (<i>Presenter Said Moukrim</i>)
6:05– 6:20	General Discussion

6:20pm (EAT)	Film festival: Perspectives on Pastoralism
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October 26th, 2021

CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 1 (DAY 2)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Sustainable Land Use
1:00 – 1:05	Introduction by Chairperson, Elkana Nyambati
1:05 – 1:20 Oral 1	Grasses and Ruminants That Will Help Save Space Ship Earth (<i>Presenter Albert Craig</i>)
1:20 – 1:35 Oral 2	GróLind – Sustainable Land use Based on Ecological Knowledge (<i>Presenter Bryndís Marteinsdóttir</i>)
1:35 – 1:50 Oral 3	Holistic planned grazing can improve vegetation attributes of the semi- arid communal rangeland of the Lowveld in the Eastern Cape, South Africa (<i>Presenter Silas Mufambi Mudyiwa</i>)
1:50 – 2:05 Oral 4	Indian Forage Scenario – Region wise availability and deficit (<i>Presenter Ajoy Roy</i>)
2:05 – 2:20 Oral 5	Pre- and Post-Degradation Managements of Rangeland: Implications for Sustainable Management (<i>Presenter Samuel Tuffa Kawo</i>)
2.20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 2 (DAY 2)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forage evaluation & agronomy
1:00 – 1:05	Introduction by Chairperson, Derek Woodfield

1:05 – 1:20 Oral 1	Induction of tetraploid ruzigrass (<i>Brachiaria ruziziensis</i>) by colchicine and possibility of using seed weight as screening method (Presenter Rattikan Pongkaew)
1:20 – 1:35 Oral 2	Differences in Urochloa hybrids and cultivars biomass production in several sites in western Kenya (Presenter Solomon Mwendia)
1:35 – 1:50 Oral 3	Formononetin of Red Clover (<i>Trifolium pratense</i> L.) as affected by water availability (Presenter Fernando Ortega-Klose)
1:50 – 2:05 Oral 4	Evaluation of Yields and Nutritive Composition of Dual Purpose Sweet Potato Vine Cultivars for Forage Use (Presenter Naftal Ondabu)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 3 (DAY 2)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forage legume ecosystem services in sustainable livestock systems
1:00 – 1:05	Introduction by Chairperson, Jose Dubeux
1:05 – 1:20 Oral 1	Forage legumes in tropical regions: recent advances and future challenges (Presenter Daniel Casagrande)
1:20 – 1:35 Oral 2	Sustainable Intensification of Livestock Systems Using Forage Legumes (Presenter Jose Dubeux)
1:35 – 1:50 Oral 3	The Importance of Forage Legume Inclusion Within Agricultural Swards to Enhance Water Infiltration Rates and Earthworm Activity (Presenter Helen Sheridan)
1:50 – 2:05 Oral 4	Tree legumes as sustainable ecosystem services in livestock systems (Presenter James Muir)
2:05 – 2:20 Oral 5	Legumes as a Strategy for Reducing Greenhouse Gas Emissions of Forage-livestock Systems (Presenter Nicolas DiLorenzo)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 4 (DAY 2)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Sustainable management of grassland/rangeland ecosystems
1:00 – 1:05	Introduction by Chairperson, Hitosh Nakagawa
1:05 – 1:20 Oral 1	Short-Term High-Performance Pastures in Australia (Presenter Rob Eccles)
1:20 – 1:35 Oral 2	A systematic review of ecological and production outcomes under rest-grazing systems (Presenter Sarah McDonald)

1:35 – 1:50 Oral 3	Restoring value to grassland initiative: to maintain the environmental and economic value of grassland and to promote their social and cultural functions globally (<i>Presenter Liz Wedderburn</i>)
1:50 – 2:05 Oral 4	Revisiting the mutual reciprocity of human-ecological systems: Integrating extensive agriculture and transhumant pastoralism in the Northern states of India (<i>Presenter Aayushi Malhotra</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 5 (DAY 2)
Theme	5. DROUGHT MANAGEMENT AND CLIMATE CHANGE IN RANGELAND/GRASSLAND
Topic	Droughts and degradation - social ecological perspectives on tipping points in dryland rangeland
1:00 – 1:05	Introduction by Chairperson, Gunnar Dressler
1:05 – 1:20 Oral 1	Rangeland management in Namibia in the face of looming desertification: Insights from the freehold farmers' perspective (<i>Presenter Katja Brinkmann</i>)
1:20 - 1:35 Oral 2	Strategies for characterizing grassland degradation with biogeochemical models (<i>Presenter Susanne Rolinski</i>)
1:35 - 1:50 Oral 3	Stakeholder attitudes towards wildlife-based land use in Namibia's Kunene Region (<i>Presenter Robert Luetkemeier</i>)
1:50 - 2:05 Oral 4	Towards early warning signals for desertification (<i>Presenter Sara Heshmati</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm	Room 6 (DAY 2)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	International Year of Rangeland and Pastoralists, Part 1 – Panels 1 and 2 (LIVE)
Chair	Barbara Hutchinson
1:00 – 1:05	Welcome Speech (<i>Dana Kelly, President IRC</i>)
1:05 – 1:10	Opening Speech (<i>Munkhnasan Nasaa, Ministry of Food, Agriculture and Light Industry, Government of Mongolia</i>)
1:10 – 1:20 Oral 1	Introduction to IYRP, history, process, priority themes and way forward (<i>Presenter Barbara Hutchinson</i>)
Panel 1 Topic	Land use/tenure and governance
Moderator	Ann Waters-Bayer
1:20 – 1:25 Oral 2	Priority areas for action and research on pastoralism and rangeland in Eastern Africa (<i>Presenter Michael Odhiambo</i>)

1:25 – 1:28 Oral 3	Rangeland and pastoralism in Mongolia and Central Asia: challenges and perspectives (<i>Presenter - Tungalag Ulambayar</i>)
1:28 – 1:31	The case of West and Central Africa (<i>Speaker Mohammed Bello Tukur</i>)
1:31 – 1:50	General discussion
1:50 – 1:55	HEALTH BREAK
Panel 2 Topic	Social/economic services and demography
Moderator	Igshaan Samuels
1:55 – 2:00 Oral 4	Rangeland and pastoralism of the Middle East and North Africa: from reality to dream (<i>Presenter Nahid Naghizadeh</i>)
2:00 – 2:03 Oral 5	Action Plan for the International Year of Rangeland and Pastoralists (IYRP): the case of the United States, Canada and Mexico (<i>Presenter Barry Irving</i>)
2:03 – 2:06	The case of Southern Africa (<i>Speaker Prisca Mugabe</i>)
2:06 – 2:35	General discussion
2:35– 4:45	BREAK
CONCURRENT SESSION 3, 1:00 – 2:35 pm (EAT)	Room 7 (DAY 2)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Local knowledge, local and global action
1:00 – 1:05	Introduction by Chairperson, Mengli Zhao
1:05 – 1:20 Oral 1	Valuing the expertise of mobile herders in arid South Africa- a photographic essay (<i>Presenter Clement Cupido</i>)
1:20 – 1:35 Oral 2	Pastoral Traditional Calendars under Globalization: A Comparative Study of Hungarian and Persian Shepherd Calendars (<i>Presenter Abolfazl Sharifian Bahraman</i>)
1:35 – 1:50 Oral 3	Transdisciplinary research in practice: lessons from participatory, folklore and community-supported approaches in the US Great Plains. (<i>Presenter Hailey Wilmer</i>)
1:50 – 2:05 Oral 4	Shift in management strategy of yak herding in the south of Mustang District, Nepal, Himalaya (<i>Presenter Hiroki Anzai</i>)
2:05 – 2:20 Oral 5	Women and their children in charge of management decisions of a communal range (<i>Presenter Laura Karen Trejo Arista</i>)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
KEYNOTES 2:45 – 4:50 pm (EAT)	Plenary Hall (DAY 2) (LIVE)
2:45 – 2:50	Introduction by Chairperson, Elly Sabiiti
2:50 – 3:10	Theme Keynote 2 - Forage Production and Utilization Dr. John Caradus - Chief Executive, Grasslanz Technology Ltd
3:10 – 3:30	Theme Keynote 3 - Livestock Production Systems Dr. Jimmy Smith - Director General, International Livestock Res. Institute

3:30 – 3:50	Theme Keynote 4 - <i>Range/Grassland Ecology</i> <i>Prof. Brandon Bestelmeyer - USDA-ARS Jornada Experimental Range</i>
3:50 - 4:20	General Discussion
4:20 – 4:30	HEALTH BREAK
CONCURRENT SESSION 4, 4:30 – 6:00 pm (EAT)	Room 1 (DAY 2)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Grazing, soil nutrient and properties
4:30 – 4:35	Introduction by Chairperson, Elly Sabiiti
4:35 – 4:50 Oral 1	Carbon and nitrogen pools in soil aggregates were affected by grazing component ---- results from dry and wet sieving methods (<i>Presenter NAN LIU</i>)
4:50 – 5:05 Oral 2	Influence of seasonality and agricultural practices on soil microbes in Kamishihoro, Japan (<i>Presenter Yvonne Musavi Madegwa Madegwa</i>)
5:05 – 5:20 Oral 3	Soil carbon stocks are relatively stable under New Zealand hill country pastures with contrasting phosphorus and sheep stocking regimes (<i>Presenter Ronaldo Vibart</i>)
5:20 - 6.00	General Discussion
CONCURRENT SESSION 4, 4:30 – 6:05 pm (EAT)	Room 2 (DAY 2)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Community composition and ecological drivers
4:30 – 4:35	Introduction by Chairperson, Adugna Tolera
4:35 – 4:50 Oral 1	Climate variability and fire-management practices in the Wood-bush Granite Grassland of South Africa: effects on grassland diversity (<i>Presenter Marlize Muller</i>)
4:50 – 5:05 Oral 2	Mongolian rangeland have a great potential for natural recovery (<i>Presenter Bulgamaa Densambuu</i>)
5:05 – 5:20 Oral 3	Germinable soil seed bank of <i>Bothriochloa macra</i> dominated pasture in south-eastern Australia (<i>Presenter Meredith Mitchell</i>)
5:20 – 5:35 Oral 4	Effects of <i>Parthenium hysterophorus</i> on grassland community in Nyando sub-county, Kenya (<i>Presenter Boniface Muli Mutua</i>)
5:35 - 6.00	General Discussion
CONCURRENT SESSION 4, 4:30 – 6:00 pm (EAT)	Room 3 (DAY 2)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Tropical Forages Genetic Resources
4:30 – 4:35	Introduction by Chairperson, Jesse Morrison
4:35 – 4:50 Oral 1	Forage Genetic Resources in Brazil (<i>Presenter Liana Jank</i>)

4:50 – 5:05 Oral 2	Future Generations – Will Any Be Lacking Tropical Forage Genetic Resources? (<i>Presenter Brigitte Maass</i>)
5:05 - 5:20 Oral 3	Rebuilding a Tropical Forages for the Future Network – A Call for Resuscitating Enthusiasm for a Commodity with Great Prospects and Innovation Potential (<i>Presenter Bruce Pengelly</i>)
5:20 – 5:35 Oral 4	Linking demand with supply for Tropical Forage Genetic Resources to reach impact at scale (<i>Presenter Michael Peters</i>)
5:35 - 6.00	General Discussion
CONCURRENT SESSION 4, 4:30 – 6:00 pm (EAT)	Room 4 (DAY 2)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Small ruminants production systems
4:30 – 4:35	Introduction by Chairperson, Jack Ouda
4:35 – 4:50 Oral 1	Ewe daily-weight gain grazing <i>Leucaena leucocephala</i> - <i>Megathyrus maximus</i> CV Mombasa silvopastoral system and tropical native unimproved range (<i>Presenter Laura Karen Trejo Arista</i>)
4:50 – 5:05 Oral 2	Impact of Fescue Toxicosis on Fetal Development and Postnatal Growth (<i>Presenter Susan Duckett</i>)
5:05 – 5:20 Oral 3	Simulation of alternative plans for community based goat breeding program in Arid, Semi-Arid and Mixed production systems in Ethiopia (<i>Presenter Temesgen Jembere Bakara</i>)
5:20 - 6.00	General Discussion
CONCURRENT SESSION 4, 4:30 – 6:00 pm (EAT)	Room 5 (DAY 2)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Governance, Investment, infrastructure and markets
4:30 – 4:35	Introduction by Chairperson, Getachu Gebre Tegegn
4:35 – 4:50 Oral 1	Perceptions on governance and knowledge flow on effective adaptation to climate changes within community-based conservancies in Kenya. (<i>Presenter Staline Kibet</i>)
4:50 – 5:05 Oral 2	Climate Change Policy Narratives and Pastoralist Predicaments in the Horn of Africa: Insights from Ethiopia and Kenya (<i>Presenter Thomas Campbell</i>)
5:05 – 5:20 Oral 3	Large scale land investments and food security in agro-pastoral areas of Ethiopia (<i>Presenter Adugna Eneyew Bekele</i>)
5:20 – 5:35 Oral 4	Exploring institutional drivers and social thresholds of transformation and mobility in pastoral social-ecological systems in Mongolia (<i>Presenter Ulan Kasymov</i>)
5:35 - 6.00	General Discussion
CONCURRENT SESSION 4, 4:30 – 6:00 pm	Room 6 (DAY 2)

Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	International Year of Rangeland and Pastoralists, Part 2 – Panels 3 and 4 (LIVE)
Chair	Maryam Niamir-Fuller
4:30 – 4:40	Recap of Panels 1 and 2 (<i>Presenters A. Waters-Bayer and I. Samuels</i>)
Panel 3 Topic	Climate change and ecosystem health
Moderator	Layne Coppock
4:40 – 4:45 Oral 6	Action Plan for the International Year of Rangeland and Pastoralists (IYRP): the case of Mexico (<i>Presenter Elisabeth Huber-Sannwald</i>)
4:45 – 4:48 Oral 7	Challenges of pastoralism and rangeland in Europe (<i>Presenter Pablo Manzano</i>)
4:48 – 4:51	The case of South Asia (<i>Speaker DK Sadana</i>)
4:51 – 5:15	General discussion
5:15 – 5:25	Break: Mongolian Awards Ceremony for Best Pastoralist Community (Announcers Hijaba Ykhanbai and Jim O'Rourke)
Panel 4 Topic	Congress resolutions
Moderator	Fiona Flintan
5:25 – 5:35	Presentation of draft resolutions, history and process (<i>Speaker Jim O'Rourke</i>)
5:35 – 5:55	General discussion
5:55 – 6:00	Closing and conclusions (<i>Speaker Maryam Niamir-Fuller</i>)
CONCURRENT SESSION 4, 4:30 – 6:00 pm (EAT)	Room 7 (DAY 2)
Theme	7. CAPACITY, INSTITUTIONS AND INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN RANGELAND/GRASSLAND
Topic	Participatory monitoring and silvopastoral systems
4:30 – 4:35	Introduction by Chairperson, Babo Fadlala
4:35 – 4:50 Oral 1	Silvopastoral strategy and sustainable management of forests in Morocco (<i>Presenter Mustapha Naggar</i>)
4:50 – 5:05 Oral 2	Status, management and governance of the communal grassland of Ethiopia's highlands: a disappearing asset for mixed crop-livestock livelihood systems (<i>Presenter Bedasa Eba</i>)
5:05 – 5:20 Oral 3	Land Users - Land Watchers (<i>Presenter Jóhann Helgi Stefánsson</i>)
5:20 – 5:35 Oral 4	The role of indigenous knowledge in the effective collective management of the communal rangeland. (<i>Presenter Andiswa Finca</i>)
5:35 - 6.00	General Discussion
6.05 pm (EAT)	POSTER SESSION (Manned) (DAY 2)

October 27th, 2021

PASTORALISTS AWARDS By SEVA 12.30 – 1.00 pm (EAT)	EXHIBITION HALL
1st MID-CONGRESS TOURS 1:00 – 2.00 pm (EAT)	VIRTUAL TOUR HALL (DAY 3)
1:00 – 1:15	1. East Africa's Drylands: Big Lands, Big Opportunities
1:15 – 1:30	2. The National Parks of Kenya: Our wildlife heritage
1:30 – 1:45	3. IGAD protocol on Pastoral transhumance
1:45 – 2:00	4. Rangeland management and carbon credits in Kenya
2:00 – 2:15	HEALTH BREAK
CONCURRENT BUSINESS MEETINGS 2.15 – 3.45 pm	(DAY 3)
IGC BUSINESS MEETING	BUSINESS MEETINGS ROOM 1 (LIVE)
IRC BUSINESS MEETING	BUSINESS MEETINGS ROOM 2 (LIVE)
3:45 – 4:00	HEALTH BREAK
2nd MID-CONGRESS TOURS 4:00 – 4:15 pm (EAT)	VIRTUAL TOUR HALL (DAY 3)
4:00 – 4:15	5. From cows to camels how pastoralists are adapting to climate change in Kenya's drylands

October 28th, 2021

CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 1 (DAY 4)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Ecohydrology and plant responses
1:00 – 1:05	Introduction by Chairperson, Valheria Castiblanco
1:05 – 1:20 Oral 1	Effects of thinning density on soil water content of alfalfa and David peach intercropping in the hilly Loess Plateau, China (<i>Presenter Zhixue Chen</i>)
1:20 – 1:35 Oral 2	How resources capture rate is related to resource partitioning in water limited annual plant communities (<i>Presenter Guy Dovrat</i>)
1:35 – 1:50 Oral 3	Rangeland rehydration: collaboration between land managers, government and private experts (<i>Presenter Paul Theakston</i>)

1:50 – 2:05 Oral 4	Woody Plant Species Composition and Diversity in Rusinga Island, Homa Bay County, Kenya (<i>Presenter Margeret Nyaga</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 2 (DAY 4)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Fire ecology, plant responses and management
1:00 – 1:05	Introduction by Chairperson, Adesegon Adebola
1:05 – 1:20 Oral 1	Hydraulic responses of shrubs and grasses to fire frequency and drought in a tallgrass prairie experiencing bush encroachment (<i>Presenter Kimberly O'Keefe</i>)
1:20 – 1:35 Oral 2	Prescribed fire plus grazing horses: A sustainable model to decrease fire hazard in a mountain landscape (<i>Presenter Filipa Manso</i>)
1:35 – 1:50 Oral 3	Modelling grazing and burning in communal rangeland systems to help understand trade-offs between production, carbon and water (<i>Presenter - Heidi Hawkins</i>)
1:50 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 3 (DAY 4)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Water Stress & Water Use Efficiency
1:00 – 1:05	Introduction by Chairperson, Ann Notenbeart
1:05 – 1:20 Oral 1	Effect of water stress on the digestibility of fibre in maize vegetative tissues. (<i>Presenter Gonzalo Ferreira</i>)
1:20 – 1:35 Oral 2	The effect of water deficits on the reproductive development of subterranean clover and annual medic (<i>Presenter Edwin - Ted Wolfe</i>)
1:35 – 1:50 Oral 3	The response of perennial ryegrass pastures in northern Victoria, Australia to increasing summer drought conditions and high summer temperatures. (<i>Presenter Mary-Jane Rogers</i>)
1:50 – 2:05 Oral 4	Sowing rate effects on forage oat biomass yield in the Qinghai-Tibetan Plateau (<i>Presenter Caiting Liu</i>)
2:05 – 2:20 Oral 5	Irrigation management strategies for fodder beet (<i>Beta vulgaris</i> L.) crops (<i>Presenter Edith Khaembah</i>)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK

CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 4 (DAY 4)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Challenges on livestock production and rangeland/grassland utilization in southern South America
1:00 – 1:05	Introduction by Chairperson, Walter Ayala
1:05 – 1:20 Oral 1	Sustainable intensification in crop-livestock systems (<i>Presenter Pablo Rovira</i>)
1:20 – 1:35 Oral 2	The importance of Campos ecosystem as a world food producer and as a provider of ecosystem services. (<i>Presenter Walter Ayala</i>)
1:35 – 1:50 Oral 3	Using perennial rangeland grasses for bioenergy and cattle grazing (<i>Presenter Susana Feldman</i>)
1:50 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 5 (DAY 4)
Theme	5. DROUGHT MANAGEMENT AND CLIMATE CHANGE IN RANGELAND/GRASSLAND
Topic	Climate Change Impacts and Mitigation
1:00 – 1:05	Introduction by Chairperson, Prof Fujiang
1:05 – 1:20 Oral 1	Differential effects of changed precipitation patterns on co-existing dominant species in Inner Mongolia typical grassland: significance for drought management (<i>Presenter Shuang-Xi Zhou</i>)
1:20 – 1:35 Oral 2	Global rangeland systems at threat under climate change and variability (<i>Presenter Cecile Godde</i>)
1:35 – 1:50 Oral 3	Visual assessment of soil structure as an early indicator of soil quality in response to intensive rotational grazing (<i>Presenter Nikola Teutscherova</i>)
1:50 – 2:05 Oral 4	Interventions for mitigating drought-related livestock mortality in Africa's drylands: a review of their relevance and effectiveness with special reference to Kenya (<i>Presenter Bulle Dabasso</i>)
2:05 – 2:20 Oral 5	Uses and knowledge of plant species by Mongolian herders in the Gobi Desert and identification of species of interest for planting (<i>Presenter Annaël Barnes</i>)
2.20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 6 (DAY 4)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Developing environmental services payments schemes for grassland in china and Mongolia
1:00 – 1:05	Introduction by Chairperson, David Kemp

1:05 – 1:20 Oral 1	Management changes and strategies to improve the environmental services from grassland in northern China and Mongolia (<i>Presenter David Kemp</i>)
1:20 – 1:35 Oral 2	Description of the state of grassland across Inner Mongolia and Mongolia (<i>Presenter Guodong Han</i>)
1:35 – 1:50 Oral 3	Herders' attitude and decision making in stocking rates and implication for grassland management in China (<i>Presenter Li Ping</i>)
1:50 – 2:05 Oral 4	Implications of herder attitudes for stocking rates in China and Mongolia (<i>Presenter Li Ping</i>)
2:05 – 2:20 Oral 5	Modelling the long-term impact on herder incomes and environmental services in an uncertain world (<i>Presenter Karl Behrendt</i>)
2:20 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 7 (DAY 4)
Theme	7. CAPACITY, INSTITUTIONS AND INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN RANGELAND/ GRASSLAND
Topic	Accelerating the use of participatory action research for development in pastoral lands: challenges and opportunities
1:00 -1:05	Introduction by Chairperson, Kathleen Galvin
1:05 – 1:20 Oral 1	Co-produced research supports pastoralists to pursue transformative social and ecological change in rangeland (<i>Presenter Robin Reid</i>)
1:20 – 1:35 Oral 2	Engaged Research Can Advance Knowledge AND Promote Positive Change Among the Rural Poor (<i>Presenter David Layne Coppock</i>)
1:35 – 1:50 Oral 3	Whose Knowledge Counts?: Irrigation Development in Turkana County, northwest Kenya (1963-2019) (<i>Presenter Gregory Akall</i>)
1:50 – 2:05 Oral 4	Producing useful knowledge for sustainable development (<i>Presenter Kathleen Galvin</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK
CONCURRENT SESSION 5, 1:00 – 2:35 pm (EAT)	Room 8 (DAY 4)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Climate change; adaptations and resilience of Livestock systems
1:00 – 1:05	Introduction by Chairperson, Joseph Mureithi
1:05 – 1:20 Oral 1	Assessing the potential of diverse mixtures to reduce enteric CH ₄ emissions (<i>Presenter Cecilia Loza</i>)

1:20 – 1:35 Oral 2	Livestock corridors working as pollinator refuges and dispersal hotspots: lessons from Spain (<i>Presenter Pablo Manzano</i>)
1:35 – 1:50 Oral 3	The hunt for the “holy grail”: condensed tannins in perennial forage legumes (<i>Presenter John Caradus</i>)
1:50 – 2:05 Oral 4	Understanding the effects of a tannin extract on forage protein digestion in ruminant’s gastrointestinal tract using a dynamic artificial digestive system coupled to a peptidomic approach (<i>Presenter Thierry Sayd</i>)
2:05 – 2:35	General Discussion
2:35 – 2:45	HEALTH BREAK

KEYNOTES 2:45 – 4:50 pm (EAT)	Plenary Hall (DAY 4) (LIVE)
2:45 – 2:50	Introduction by Chairperson, Jesse Njoka
2:50 – 3:10	Theme Keynote 5 - <i>Drought Management and Climate Change in Rangeland/Grassland</i> <i>Prof. Mark Howden - Director, Climate Change Institute, The Australian National University</i>
3:10 – 3:30	Theme Keynote 6 - <i>Wildlife, Tourism and Multi-facets of Rangeland/Grassland</i> <i>Dr. John Waithaka - Regional Vice Chair, East and Southern Africa World Commission on Protected Areas</i>
3:30 – 3:50	Theme Keynote 7 - <i>Pastoralism, Social, Gender and Policy Issues</i> <i>Ms. Nahid Naghizadeh – Centre for Sustainable Development and Environment (CENESTA), Tehran, Iran</i>
3:50 - 4:20	General Discussion
4:20 – 4:30	HEALTH BREAK
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 1 (DAY 4)
Theme	1. RANGE/GRASSLAND ECOLOGY
Topic	Commons: old, current and future challenges for rangeland what innovations in collective issues to face these challenges (LIVE)
4:30 – 4:35	Introduction by Chairperson, Jean F. Tourrand

4:35 – 4:47 Oral 1	Collaborative construction of a method that contributes to improve the decision making in associative ranches by controlling the grass allowance in a context of climate variability. (<i>Presenter Emilio Duarte Esteves</i>)
4:47 – 4:59 Oral 2	Collective Approach of Rural Development: Case Study of “Maronna Foundation” in the Pampa Bioma, Rio Grande do Sul, Brazil (<i>Presenter Vicente Celestino Pires Silveira</i>)
4:59 – 5:11 Oral 3	Identifying land use options for networked Māori owned land blocks to deliver on collective aspirations in the North Island of New Zealand (<i>Presenter Nicole McCrossin</i>)
5:11 – 5:22 Oral 4	Rangeland in Marajo Island, Brazilian Amazonia, a Long History of Commons for Small-Breeders (<i>Presenter Tienne BARBOSA</i>)
5:22 – 5:34 Oral 5	Local Development Policy over the last century in Special Areas/ Great Prairie, Alberta Canada (<i>Presenter Peggy Strankman</i>)
5:34 – 5:46 Oral 6	Intensive Poultry Production as a “Collective” Initiative to Face Global Change in the Bedouin Area of the North West Coast Zone (NWCZ), Egypt (<i>Presenter Mona Abdelzaher Ahmed OS-MAN</i>)
5:46 - 6.05	General Discussion
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 2 (DAY 4)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forage planning and management
4:30 – 4:35	Introduction by Chairperson, David Miano Mwangi
4:35 – 4:50 Oral 1	Nutritional characteristics of different grass and legume mixtures estimated by in sacco and in vitro gas production (<i>Presenter Yvette Giramahoro</i>)
4:50 – 5:05 Oral 2	Closing feed gaps by winter forage production in Limpopo: What is the potential? (<i>Presenter Sala Alanda Lamega</i>)
5:05 – 5:20 Oral 3	Maintain forage yields in long- and short-term grassland in Norway (<i>Presenter Ievina Sturite</i>)
5:20 – 5:35 Oral 4	Regeneration of old ungrazed old man saltbush (<i>Atriplex nummularia</i>) stands in south-west Australia (<i>Presenter Sarita Bennett</i>)
5:35 - 6.05	General Discussion
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 3 (DAY 4)
Theme	2. FORAGE PRODUCTION AND UTILIZATION
Topic	Forage and Animal Nutrition
4:30 – 4:35	Introduction by Chairperson, An Notenbaert
4:35 – 4:50 Oral 1	Isolation, purification and identification of lactic acid bacteria strains and their effects on the fermentation dynamics and microbial community of elephant grass (<i>Pennisetum Purpureum</i>) silage (<i>Presenter Azizza Mala</i>)

4:50 – 5:05 Oral 2	Effectiveness of solarization pre-treatment for improvement of feeding value of wheat straw by white rot fungi inoculation (<i>Presenter Joshua Njolomba</i>)
5:05 – 5:20 Oral 3	The CROPGRO Perennial Forage Model Simulates Productivity and Re-growth of Tropical Perennial Grasses (<i>Presenter Kenneth Boote</i>)
5:20 - 6.05	General Discussion
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 4 (DAY 4)
Theme	3. LIVESTOCK PRODUCTION SYSTEMS
Topic	Utilization of Grassland/Rangeland
4:30 – 4:35	Introduction by Chairperson, Michael Peters
4:35 – 4:50 Oral 1	What's on the menu today? Feeding habits and movement patterns of domestic and wild ungulates in the Dzungarian Gobi, Mongolia (<i>Presenter Lena Michler</i>)
4:50 – 5:05 Oral 2	Where is the livestock future – plate- or land-based? The potential of knowledge-based, holistic grazing concepts for altering grazing livestock systems (<i>Presenter Juliane Horn</i>)
5:05 – 5:20 Oral 3	Diet selection by goats at Kalemendo, North Darfur, Sudan (<i>Presenter Abdelrahim Mansoor</i>)
5:20 – 5:35 Oral 4	Choosy grazers and plant communities – Interactions between cattle breeds and vegetation in semi-natural pastures (<i>Presenter Caren Pauler</i>)
5:35 - 6.05	General Discussion
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 5 (DAY 4)
Theme	4. WILDLIFE, TOURISM AND MULTI-FACETS OF RANGELAND/GRASSLAND
Topic	A Revolution in Conservation Innovation By and With Pastoralists: Examples from Kenya, Africa and the globe (LIVE)
4:30 – 4:35	Introduction by Chairperson, Robin Reid & Nickson Parmisa
4:35 – 4:50 Oral 1	Conservation Innovation in Pastoral Lands around the Globe: Challenges, Lessons and Opportunities (<i>Presenter Robin Reid</i>)
4:50 – 5:05 Oral 2	Social-Ecological Innovations and Outcomes of Community-Based Conservation in Africa: Implications for the Future (<i>Presenter Kathleen Galvin</i>)
5:05 – 5:20 Oral 3	Wildlife Conservation Innovations and the Role of Indigenous Pastoral Communities living around Protected Areas in Kenya (<i>Presenter Nickson Parmisa</i>)
5:20 – 5:35 Oral 4	When good conservation becomes good economics (<i>Presenter Mohammed Yahya Said</i>)
5:35 - 6.05	General Discussion

CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 6 (DAY 4)
Theme	6. PASTORALISM, SOCIAL, GENDER AND POLICY ISSUES
Topic	Gender and indigenous perspectives for sustainable rangeland: gendering and decolonizing pastoralist studies and rangeland conservation
4:30 – 4:35	Introduction by Chairperson, Maria Fernandez-Gimenez & Elisa Oteros-Rozas
4:35 – 4:50 Oral 1	Knowledge about and knowledge with: contributions from feminist research to knowledge co-production for pastoral systems (<i>Presenter Federica Ravera</i>)
4:50 – 5:05 Oral 2	Sustainable development and the transformation of female rural labour: The case of woman cattle ranchers in Uruguay (<i>Presenter Virginia Courdin</i>)
5:05 – 5:20 Oral 3	Revitalizing Ecological Calendars: An Indigenous Climate Solution from Alai valley of Kyrgyzstan (<i>Presenter Daler Kaziev</i>)
5:20 – 5:35 Oral 4	Socially differentiation in (agro)pastoral climate change adaptation: Intersectional perspectives on socio-technical change in Kenya and Burkina Faso (<i>Presenter Todd Crane</i>)
5:35 – 5:50 Oral 5	Women's empowerment for demographic issues and conflicts in African pastoralist societies (<i>Presenter Pablo Manzano</i>)
5:50 - 6.05	General Discussion
CONCURRENT SESSION 6, 4:30 – 6:05 pm (EAT)	Room 7 (DAY 4)
Theme	7. CAPACITY, INSTITUTIONS AND INNOVATIONS FOR SUSTAINABLE DEVELOPMENT IN RANGELAND/GRASSLAND
Topic	Re-envisioning Rangeland in the 21st Century: Overcoming the Marginalization Narrative
4:30 – 4:35	Introduction by Chairperson, David D. Briske
4:35 – 4:50 Oral 1	Creating win-win policies for sustainable pastoralism (<i>Presenter Elisabeth Huber-Sannwald</i>)
4:50 – 5:05 Oral 2	Does donor facilitation approach influence social outcomes of Community-based rangeland management in Mongolia? (<i>Presenter Tungalag Ulambayar</i>)
5:05 – 5:20 Oral 3	Conceptualizing Pastoral Development Based on Carbon Sequestration: The Case of Yabelo District in the Southern Ethiopian Rangeland (<i>Presenter David Layne Coppock</i>)

5:20 – 5:35 Oral 4	Re-envisioning Global Rangeland Stewardship: An Ecosystem Services Assessment Framework (<i>Presenter David Briske</i>)
5:35 - 6.05	General Discussion
6:05 pm (EAT)	POSTER SESSION (<i>Manned</i>) (DAY 4)

October 29th, 2021

PANEL DISCUSSION DROUGHT MANAGENT 1:00 – 2:15 pm (EAT)	PLENARY HALL (DAY 5) (LIVE)
1:00 – 1:05	Introduction by Moderator, Solomon Muchina Munyua ,
1:05 – 1:10 Panelist 1	Climate Change outlook and Its Impacts on Rangeland/Grassland - <i>Chris Funk</i>
1:10 – 1:15 Panelist 2	Carbon Sequestration and GHG fluxes in Grassland/Rangeland- <i>Beverley Henry</i>
1:15 – 1:20 Panelist 3	Degradation in Rangeland/Grassland and impact on livestock production - <i>Pierre Gerber</i>
1:20 – 1:25 Panelist 4	Drought and climate change Resilience in Rangeland/Grassland - <i>John Patric Kabayo</i>
1:25 – 2:15	Discussion
2:15 – 2:30	HEALTH BREAK
PANEL DISCUSSION: PASTORALISM 2:30 – 3:45 pm (EAT)	PLENARY HALL (DAY 5) (LIVE)
2:30 – 2:35	Introduction by Moderator, Luther Anukur
<i>Session: Pastoralism and rangeland management</i>	
2:35 – 2:40 Panelist 1	The role of pastoralists' knowledge and institutions in rangeland management – <i>Jonathan Davies</i>
2:40 – 2:50	Q & A
<i>Session: Valuing variability through sustainable pastoralism: knowledge gaps and re-search priorities</i>	
2:50 – 2:55 Panelist 3	The role of pastoral mobility in valuing variability – <i>Saverio Krätli</i>
2:55 – 3:00 Panelist 4	Governance for sustainable pastoralism that creates value out of variability – <i>Pius Loupa</i>
3:00 – 3:15	Q & A
<i>Session: Investment in sustainable pastoralism for rangeland restoration</i>	
3:15 – 3:20 Panelist 5	Resource mobilization for research in sustainable pastoralism – <i>Hussein Wario</i>
3:20 – 3:25 Panelist 6	Land degradation neutrality and sustainable rangeland management – <i>Barron Orr</i>
3:25 -3:35	Q & A
3:35 – 3:45	CONCLUSION
3:45 – 4:00	HEALTH BREAK

SUMMARY PAPERS 4:00 – 4:30 pm (EAT)	PLENARY HALL (DAY 5) (LIVE)
Chair	Bockline Omedo Bebe
4:00 – 4:15 pm	Summary paper on Rangeland (<i>Secretary – IRC Continuing Committee</i>)
4:15 – 4:30 pm	Summary paper on Grassland (<i>Secretary – IGC Continuing Committee</i>)
CLOSING CEREMONY 4:30 – 5:30 pm (EAT)	PLENARY HALL (DAY 5) (LIVE)
Chair	Eliud Kireger
Speeches:	
<i>Chairperson IGC</i>	Ray Smith
<i>President IRC</i>	Dana Kelly
<i>GOK Official</i>	Mr. Harry Kimtai
Announcements -Invitation to IGC 2023 -Invitation to IRC 2025	



ABOUT THE JOINT INTERNATIONAL GRASSLANDS AND RANGELANDS CONGRESS

International Grassland Congress (IGC)

Grasslands cover a very large portion of the earth's surface and are important as a feed source for livestock, as a habitat for wildlife, environmental protection, carbon sink and for in situ conservation of plant genetic resources. In developed and developing countries, many millions of livestock farmers, ranchers and pastoralists depend on grasslands and conserved products such as hay and silage and on a range of fodder crops for their livelihoods. Grasslands also contribute significantly to cropping systems, with a large part of crop yields being dependent upon the benefits of the pastures and herbaceous legumes. The International Grassland Congress is held in every 3-5 years and promotes interchange of information on all aspects of natural and cultivated grasslands and forage crops for the benefit of mankind, including sustained development, food production and the maintenance of biodiversity. It is the major international forum for scientists involved in grassland and livestock R&D and for people managing one of the world's largest natural resources. The International Grassland Congresses have spanned the globe in its close to 100 years' history and have been held on every continent with the last five in Brazil, Ireland, China, Australia, and India, this one in Kenya and the upcoming in the United States in 2023.

International Rangeland Congress (IRC)

Rangelands, primarily covered by natural vegetation, provide grazing and forage for livestock and wildlife. Rangeland and grassland ecosystems provide benefits vital to agriculture and the environment including: grazing and forage for livestock and wildlife; watersheds for rural and urban uses; habitat for plants, insects, and animals; water for sustainable landscapes; areas for recreation activities; and potential renewable energy and mineral resources. The International Rangeland Congress (IRC) is held every 3-5 years and its aim of the IRC is to promote the interchange of scientific and technical information on all aspects of rangelands: research, management, extension, education, training planning, and development. The last five congresses have been held in Australia, South Africa, China, Argentina, Canada, this one in Kenya and the upcoming in Australia in 2025.

The aim of the Joint XXIV International Grasslands and XI International Rangelands Congress was to promote the interchange of scientific and technical information on all aspects of grasslands and rangelands. This Joint IGC-IRC Congress was hosted by Kenya, 25th – 29th October, 2021

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