



More meat milk and eggs by and for the poor

Reducing Climate-Induced Heat Stress in Pigs in Uganda: Policy Actions

Policy engagement workshop report



10 December 2020 | Kampala, Uganda

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Citation:

Zaake, P., Mugumya, R., Rubayiza I., Wairagala, P., Paul, B.K. 2020. Reducing Climate-Induced Heat Stress in Pigs in Uganda: Policy Actions. Policy engagement workshop report. Alliance of Bioversity International and CIAT (International Center for Tropical Agriculture), Nairobi, Kenya.

Executive summary

The Alliance of Bioversity International and International Center for Tropical Agriculture (CIAT) and the International Livestock Research Institute (ILRI), together with their partners including the Ministry for Agriculture, Animal Industry and Fisheries (MAAIF) and the Ministry of Water and Environment (MWE), are jointly working on climate-change related issues in livestock in Uganda. A policy briefing event was organized in Kampala on 10th December 2020 as part of a multi-stakeholder learning series. This first briefing focussed on heat stress in pigs, one of the main anticipated direct and adverse impacts of future climate change on the pig sector in Uganda. The briefing aimed to: i) Increase awareness about livestock and climate change interactions among stakeholders in Uganda; ii) share knowledge, learnings, key insights and messages from research on heat stress adaptation in pigs as a concrete case; and iii) arrive at concrete commitments to action from policy and other actors. The event was facilitated by Dr. Maria Nassuna Musoke, lecturer at Makerere University, with physical and virtual participation of a wide range of stakeholders. After an official opening by three distinguished guests, the meeting proceeded to the science briefing, followed by a panel discussion, actions and commitments and closing remarks.

Dr. Julius Okello, Team Leader Infrastructure at the Delivery Unit of the Office of the Prime Minister (OPM), kicked off the high-level opening of the event. In his remarks, he mentioned that currently daily consumption of pigs slaughtered per day in Kampala alone is estimated at 500-1000 heads but that we need to get statistics on other areas to help guide policy formulation and implementation. He further highlighted that pig production is increasing in Uganda, but the problem of low productivity remains. He requested the MAAIF Commissioner Animal Production and Ag. Director Animal Resources to work hand-in-hand with the Prime Minister Delivery Unit to address this challenge. He stressed that Uganda is ranked number one in Eastern Africa with good policies but the challenge remains with implementation. Dr. Juliet Sentumbwe, Commissioner Animal Production and Ag. Director Animal Resources at Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), delivered the second opening remarks. She emphasized that the biggest challenge lies in lack of statistics as “we cannot talk about development when we do not have quantities or figures”. She reminded participants that MAAIF has a strategy for mitigation and adaption to climate change, and that there are efforts in place to address Climate Smart Agriculture (CSA) which are following the National Development Plan (NDP) III. She concluded by outlining that: 1) have concrete initiatives to influence investment, 2) discuss mechanisms and processes and fast track them, 3) focus on integrated approaches so that we do not waste resources by repeating what some has been done, 4) synergize our objectives involving the public and private sector, 5) move the discussion from boardrooms and hotels to action, and 6) start taking concrete actions towards the realization of the continent’s Climate Smart Agriculture aspirations. Hon. Mathias Kasamba, Member of Parliament, Chairperson of the Committee on Agriculture, Tourism and Natural Resources, East African Legislative Assembly (EALA), gave the third opening remarks. He mentioned that the cost of feeding is relatively low in Uganda, which is a large opportunity considering the high demand for pork in countries like South Sudan, Kenya and China. Hon. Mathias underlined the need for a strategic direction, including the specific targets for the pig sector already included in the Agriculture Sector Strategic Plan (ASSP) but unfortunately not yet in the NDP III. He concluded by further emphasizing the need to impart skills to the young generation, and the potential of large return to investment in the pig industry.

Dr. Emily Ouma, Senior Scientist and co-lead MorePork Uganda at the International Livestock Research Institute (ILRI), introduced the science session to participants. She started by giving an overview of CGIAR efforts in livestock and development, a Consortium of 15 International Agricultural Research Centres that have a mandate to conduct research globally, organized around 8 agri-food systems, four cross cutting research programs and three platforms. MorePork is a research project on piggery and is part of CGIAR Research Program on Livestock. The Alliance of Bioversity International and CIAT (International Center for Tropical Agriculture) leads the research under the Environment Flagship of the program within Uganda. In addition, the Program for Climate Smart Livestock Systems (PCSL), funded by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is implemented by ILRI with research sites in South Western Uganda. This program falls under the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). This policy briefing session is designed to be part of a series of learning events, co-hosted by the various institutions, partners and projects. Dr. Birthe Paul, Scientist at the Alliance of Bioversity and CIAT and Mr. John Mutua, Senior Research Associate at Alliance of Bioversity and CIAT, presented the scientific content for this briefing, focusing on reducing climate-induced heat stress

in pigs in Uganda that is summarized in a policy brief available to all participants and online. Dr. Birthe highlighted that effects of climate change on crops are much better studied, while effects on livestock have been understudied. Heat stress is among the most severe expected impacts of climate change on livestock. Pigs are especially vulnerable to heat stress due to their physiological characteristics. Climate-induced heat stress reduces pig growth, reproduction and health and may cause animals to die. Risk factors that increase heat stress include breed, management system and physiological stage. John presented data from climate modelling and projections and risk mapping, and the potential repercussions for pig sector in Uganda. Most of North-Western Uganda already experiences heat stress conditions. Currently, the likelihood of exposure to heat stress is high between December - March. Model predictions point to an increase of 1.5-3.5°C in temperature and 4-7% in relative humidity in future. Heat stress levels are therefore likely to further increase in the future - based on climate model projections, over 90% of districts will experience severe heat stress conditions by 2100. 30% (39,000 tons) of current pork production is under threat due to heat stress in future based on pessimistic scenario (RCP 8.5). Dr. Birthe returned to argue that risks span across all stages of the pig value chain from input supply to on-farm production, transport and output market – with men, women and youth affected differently. Coping and adaptation strategies exist, with coping strategies being flexible and easy to promote within the local context, and adaptation strategies requiring collective effort by stakeholders as they enable heat stress mitigation in the long term. Uganda has put in place a set of policies and plans to support climate change adaptation, supported by various stakeholders, but challenges remain: 1) Piggery is often not among the priority strategic commodities; 2) Adaptation policies, strategies, action plans and measures at both national and local levels do not specifically refer to mitigating climate-induced heat stress in pigs; 3) Where key stakeholders have made progress in joint development of related policies, strategies and plans, a gap still exists in joint implementation. Dr. Birthe concluded by outlining options for concerted action by all stakeholders, including production and value chain levels, researchers, policy makers and investors.

The panel discussion involved sharing practical experiences and perspectives on climate-induced heat stress in pigs. The panelists included Dr. Deogracious Wonekha from MAAIF, Mr. Derrick Senyonga from MWE, Dr. Joshua Zake from Environment Alert and Dr. Emma Naluyima from the National Pig Multi-Stakeholder Platform. Particular challenges were highlighted by panelists and participants: i) *Climate change* and associated heat stress reduces productivity, health and reproductive performance of pigs which can be observed in the field. Climate change can lead to unavailability of inputs, for example, insufficient maize production that leads to competition between human food and feed and subsequent feed shortages. Moreover, pests and diseases are emerging in areas previously unknown, increasing veterinary service costs. Veterinary services are not easily available in rural areas. ii) *Water availability* is a big concern, as water sources have dried up and the cost of extending water availability is quite high. MAAIF and MWE have a cost sharing initiative to address water scarcity through units for hire by farmers to boost water for production. iii) A particular concern raised by many value chain actors is the *transport of purchased pigs*. Transport is only allowed during the day and not at night, and small cars or motorbikes are commonly used which are unsuitable to shelter animals against heat and stress. Transport licenses and movement permits for traders are not always issued in a transparent way or enforced, and increase transaction costs for pig transportation. iv) Despite the existence of *climate finance*, including the Clean Development Mechanism (CDM) projects, Internationally Transferred Mitigation outcomes (ITMOS) and REDD+ initiatives, but it often remains unclear how communities can link and directly benefit. Risks and vulnerability are unevenly distributed. At global level, Uganda is more vulnerable to heat stress as a country compared to western countries. From a value chain perspective, the entire pig value chain will be hit; however, smallholder pig farmers of which are three quarters women are under pressure to produce, yet they are smallholders lacking investment capacities which often make adaptive measures unaffordable. The panel also underlined various opportunities for action by all actors. i) *Policy*: MAAIF is one of the most networked ministries of government, with extension workers up to sub-county level with technical expertise. Most of the recommendations in ASSP-2 that arose from research have been captured and include: promoting a streamlined breeding program, strengthening advisory services, institute a regulatory framework to guide to pig industry, promotion of research in pig production, and promote establishment of marketing infrastructure. MAAIF has started registration and profiling farmers involved in production of pigs to track and better support them. Through NAGRIC, appropriate breeds that can adapt to climate change are being identified. The National Agriculture Research Organization (NARO) which is under MAAIF is also carrying out research in livestock and crops and selection of appropriate technologies. MWE and MAAIF jointly came up with the National Adaptation Plan for the Agriculture Sector

(NAP-Ag), putting forward strategies to address and adapt to climate change impacts. The climate change policy from 2014 provides for a number of adaptation strategies to reduce heat stress although the strategies are not specific to pigs. Among the Nationally Determined Contributions (NDCs) under the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) that Uganda submitted in 2015, the agriculture sector is highlighted both for adaptive and mitigative measures. The process calls for development of a national Measurement, Reporting and Verification (MRV) framework to monitor all actions towards the NDCs including adaptation of the pig sector, bringing on board all stakeholders and support for the update of the NDC. With support from GIZ and UNDP, the NDC are currently updated and a long-term strategy for climate change is developed. As suggestion, MWE in collaboration with partners from January 2021 can come up with a list of strategies aligned to NDCs and NAP-Ag that can be adapted to address heat stress, fed with recommendations from research. *ii) Civil society:* Pig production provides an alternative livelihood as means of reducing pressure on the environment. There are opportunities to accelerate community-based support and action to advance climate-adaptive pig production through responsive training and awareness, and community adaptation pilots, finding better ways to utilize information obtained from research. Policy dialogue should include more actors as they have different competencies and can supplement on policy formulation. NGOs need to be part of NAP-Ag implementation and should find a way of addressing gaps along the value chain. *iii) Value chain actors and farmer networks:* Farmers can benefit from technical input from research in housing design and roofing that ensures maximum ventilation. Pig farmers should be encouraged to plant trees around the farms, since shelter and shade is needed. Irrigation in form of water for production is necessary, and rain water harvesting and storage for future use is important. Farmer groups can be organized and taught on what to do and later helped with access to finance. The National Pig Multi-Stakeholder Platform can help deal with issues across the pig value chain and create awareness among the public and law enforcers.

The policy briefing closed with concrete follow-up commitments by participants and their institutions, including MAAIF, MWE, OPM, EALA, Makerere University, UNDP, the National Pig Multi-Stakeholder Platform, Environment Alert, World Bank, NALIRRI and PAFO. Ms. Elisabeth Nsimadala, President of Pan African Farmers Association (PAFO) and Eastern Africa Farmers Federation (EAFF) gave the official closing remarks. The outputs from this workshop will contribute to the overall MorePork program under the CGIAR Research program on Livestock, and inform follow-up and prioritization on using evidence produced by research to inform policy and stakeholder action.

1. Background

The Alliance of Bioversity International and International Center for Tropical Agriculture (CIAT) and the International Livestock Research Institute (ILRI), together with their partners including the Ministry for Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Water and Environment (MWE), are jointly working on climate-change related issues in livestock in Uganda. The MorePork program under the CGIAR Research Program on Livestock aims at developing and testing an environmentally sustainable and gender inclusive integrated intervention package that aims to improve pig productivity and incomes of value chain actors. The Program for Climate Smart Livestock Systems (PCSL) under the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) supports interventions to increase the contribution of livestock to the three key pillars of Climate Smart Agriculture (CSA).

The policy briefing event was organized in Kampala on 10th December 2020 as part of multi-stakeholder learning series around livestock and climate change. This first briefing focusses on heat stress in pigs, one of the main anticipated direct and adverse impacts of future climate change on the pig sector in Uganda. Analysis of historical climate data and simulation of future periods predicts a gradual shift towards more severe heat stress conditions experienced in most parts of the country. Animals experience heat stress when subjected to a series of conditions where the animal's body is overheating. Pigs are more vulnerable to heat stress because they do not have functioning sweat glands. Heat stress distorts the pigs' feed intake, growth and reproduction and makes pigs vulnerable to diseases. This, in turn, brings economic losses. The research therefore suggests that adaptation of smallholder pig production systems to heat stress needs to be a policy priority, and recommends policy options for agricultural extension, national and local level policymakers and planners, and development donors and organizations.

Objectives

1. Increase awareness about livestock and climate change interactions among stakeholders in Uganda
2. Share knowledge, learnings, key insights and messages from research on heat stress adaptation in pigs as a concrete case
3. Arrive at concrete commitments to action from policy and other actors

The event was facilitated by Dr. Maria Nassuna Musoke, lecturer at Makerere University. The event included participants that attended physically and virtually. The event agenda (Annex 1) guided the sequence of events.



Photo 1: Dr. Maria Nassuna Musoke from Makerere University facilitating the event (Credit: CIAT/ILRI).

2. Policy briefing

Opening session

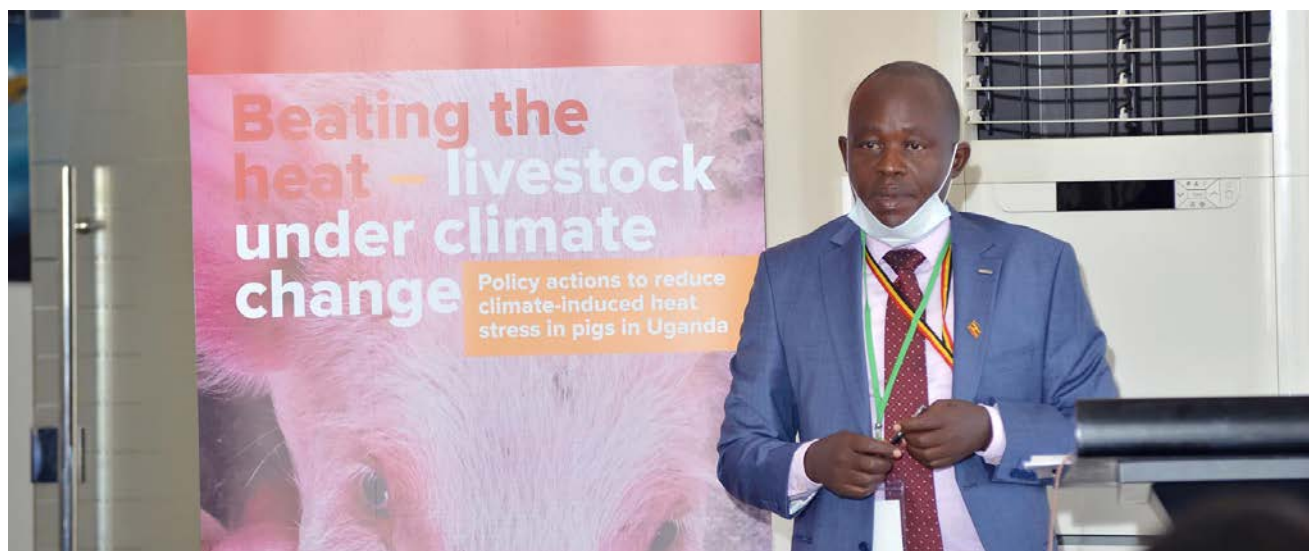


Photo 2: Dr. Julius Okello from the Office of the Prime Minister during his opening remarks (Credit: CIAT/ILRI).

The policy briefing was officially opened by three distinguished guests.

Dr. Julius noted that the Prime Minister Delivery Unit (PMDU) interventions focus on generating clear and concentrated stakeholder efforts for faster and better strategic outcomes through a methodical approach informed by the five (05) implementation Principles (5Ps) namely;

- **Prioritization**- focus on the core government priorities as identified in the NDP.
- **Planning for Implementation**- apply rigorous and detailed participatory action planning across relevant stakeholders with clear interventions, milestones, and budgets that are aligned to priorities (Delivery Labs).
- **Problem-Solving**- real time identification and resolution of bottlenecks and constraints in implementation).
- **Pressure for Results**- maintain a consistent and vigorous pursuit for results based on the identified key priorities through the use of real-time data).
- **Progress Reporting**- provide a robust system for routine tracking and reporting progress on the agreed key Government priorities and keep the Prime Minister and the President constantly updated, and support regular interface with Ministers and Permanent Secretaries for accountability.

Dr. Julius mentioned that there is need to have a national register of farmers rearing pigs. At the moment, the data is scanty, therefore, accurate statistics will help determine the location of the pig projects, the owners, their marketing strategy, number of people employed, and income earned from their efforts and other alternative sources of income.

Dr. Julius emphasized about the need to engage the youth in piggery because it's a real source of employment that could significantly contribute to the reduction of unemployed youth because the market(s) for pigs are available.

Dr. Julius elaborated the gender issue and said that most buyers prefer buying pigs from male and not women. This is not good even the men are the household decision makers, women to need to have equally say when it comes to buying and selling because women bear the burden of looking after family including their husbands who spend their incomes in drinking and marrying more women. Therefore, there is need to have affirmative action towards supporting women rearing pigs and buyers should also invite both parties (husband and wife) to be around during the price haggling.

Dr. Julius concluded by highlighting issues of transportation of the animals, hygiene, and cleanness.



Photo 3: Dr. Juliet Sentumbwe giving her opening remarks (Credit: CIAT/ILRI).

The next speaker to give the opening remarks was Dr. Juliet Sentumbwe, Commissioner Animal Production and Ag. Director Animal Resources at Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). Dr. Juliet gave an overview of livestock sector in Uganda. She outlined that livestock has the greatest capacity to stimulate a multiplier effect and that incremental effect of every additional USD spent in the sub sector will generate about 2.9 USD in primary livestock production and 5.9 USD in value added. She also underlined the manifold challenges including weak policies, outdated policies, and inadequate enforcement of policies. She added that law enforcers are continuously trained, but circumstances like facilitation affect their performance. She emphasized that the biggest challenge lies in lack of statistics since most organizations that are sources of statistics, including the Food and Agriculture Organization (FAO) of the United Nations, Uganda Bureau of Statistics, and MAAIF, rely on field staff that do not have the capacity and resources to collect data on regular basis, nor are processes in place to relay it to MAAIF. She said that “we cannot talk about development when we do not have quantities or figures”. Dr. Juliet outlined that the pig industry is growing, however the figures we rely on are estimates. She noted that pork is red meat, however there are issues to do with red vs white meat. In her view, climate change has effects on livestock production, water, pasture, diseases, and mobility of livestock in the country. She reminded the participants that MAAIF has a strategy for mitigation and adaption to climate change, though not specific for sub-sectors but with guidelines for mainstreaming. She outlined that the focus of MAAIF will be on four categories and there is need to put these into action: i) promoting highly adaptive breeds; ii) sustainable animal health management systems; iii) promoting diversification; and iv) livestock value chain development. Dr. Juliet appreciated CGIAR centers and Makerere University for documenting both constraints and opportunities in Uganda pig value chain, researching feed conservation technologies, and developing breeding technologies. She mentioned that there are efforts in place to address Climate Smart Agriculture (CSA) which are following the National Development Plan (NDP) III (www.npa.go.ug/wp-content/uploads/2020/08/NDPIII-Finale_Compressed.pdf). Although pigs are not strategically targeted, they will fall under the agriculture industrialization program next to dairy and beef which have been a major priority. She explained that there are parameters including contribution to livelihoods and export, and return-on-investment, that are used to determine which commodities to prioritize and invest in as the country has limited resources. Dr. Juliet concluded her remarks outlining the need to: 1) have concrete initiatives to influence investment, 2) discuss mechanisms and processes and fast track them, 3) focus on integrated approaches so that we do not waste

resources by repeating what some has been done, 4) synergize our objectives involving the public and private sector, 5) move the discussion from boardrooms and hotels to action, and 6) start taking concrete actions towards the realization of the continent's Climate Smart Agriculture aspirations.



Photo 4: Hon Mathias Kasamba giving his open remarks (Credit: CIAT/ILRI).

Hon. Mathias Kasamba, Member of Parliament, Chairperson of the Committee on Agriculture, Tourism and Natural Resources, East African Legislative Assembly (EALA) thanked and congratulated the organizers for this policy briefing during his opening remarks. He appreciated the policy brief session looking at the pig industry, however, he emphasized the need to see the impact of heat on other animals too including cows, goats, and rabbits. He mentioned that a pig produces more than 10 piglets which makes it a big industry in addressing food shortage. Uganda has a big potential in pig production and most of the meat from cows, goats, and pigs are consumed locally, although the demand for meat exists at regional and global level. He outlined the need to identify factors that affect pig production, one of which is climate-induced heat stress and that this knowledge has to be passed onto the young generation. He advocated for every school without a pig related taboo to have a piggery unit. He compared the cost of feeding amongst countries and mentioned that it is relatively low in Uganda, which is a large opportunity considering the high demand for pork in countries like South Sudan, Kenya and China. Hon. Mathias mentioned the need for a strategic direction and targets to be achieved, including who is going to do what, where, how and what over the next five years. He mentioned the need for sites to try out research in education institutions, communities and at centers of excellence. He suggested the need to identify productive zones in the country dedicated to specific commodities, and added that specific targets for the pigs are included in the Agriculture Sector Strategic Plan (<https://www.agriculture.go.ug/agriculture-sector-strategic-plan-assp/>) but unfortunately not embedded in the National Development Plans (<http://www.npa.go.ug/development-plans/national-development-plan-ndp/>). He concluded by further emphasizing the need to impart skills to the young generation, and the potential of large return to investment in the pig industry.

Science briefing

The science briefing session was given by Dr. Emily Ouma, Dr. Birthe Paul and Mr. John Mutua.



Photo 5: Dr. Emily Ouma introducing the science briefing session (Credit: CIAT/ILRI).

CGIAR efforts in livestock and development

Dr. Emily Ouma, Senior Scientist and co-lead MorePork Uganda at the International Livestock Research Institute (ILRI), welcomed the participants and gave an overview of CGIAR efforts in livestock and development. MorePork is a research project on piggery and is part of CGIAR Research Program on Livestock. CGIAR is a Consortium of 15 International Agricultural Research Centres that have a mandate to conduct research globally. The research portfolio is organized around 8 agri-food systems, four cross cutting research programs and three platforms. The CGIAR Research Program on Livestock is led out by ILRI, with piggery as the focus in Uganda which is one of the priority countries. The Alliance of Bioversity International and CIAT (International Center for Tropical Agriculture) leads the research under the Environment Flagship of the program within Uganda. In addition, the Program for Climate Smart Livestock Systems (PCSL), funded by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), is implemented by ILRI with research sites in South Western Uganda. This program falls under the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). This policy briefing session is designed to be part of a series of learning events, co-hosted by the various institutions, partners and projects.

The MorePork project

The piggery sector offers an opportunity for transformation since there is high demand for pork. Good technologies for higher productivity exist, though the uptake remains low, because often the return for farmers is unsatisfactory. For phase II of MorePork, it was therefore decided to take a market-based approach as entry point, targeting aggregators (people that buy pigs from producers) instead of primarily targeting farmers. Aggregators support producers through agreements to ensure quality and prices, and aggregators benefit from high quality and reliable pork supply. We offer a basket of integrated technologies that include innovations in the area of genetics, artificial insemination, animal health, feeds and environmental management.



Photo 6: Dr. Birthe Paul and Mr. John Mutua giving the heat stress science briefing virtually (Credit: CIAT/ILRI).

Heat stress science briefing

Dr. Birthe Paul, Scientist at the Alliance of Bioversity and CIAT and Mr. John Mutua, Senior Research Associate at Alliance of Bioversity and CIAT, presented the science briefing focusing on reducing climate-induced heat stress in pigs in Uganda.

Dr. Birthe gave an overview of the effects and impacts of climate change including rising temperatures, increase in heavy precipitation and humidity, increase in hunger and water crises, health risks due to raising temperatures and heatwaves, and increasing spread of pests and pathogens. It was highlighted that effects of climate change on crops are much better studied, while effects on livestock have been understudied. Effects come through the increase of carbon dioxide, increase of temperature, and increase in rainfall – impacts can be manifold and overlapping. The focus on direct climate-induced heat stress is justified as it is one of the important adverse impact with effects like reduced production, reproduction and health. Amongst the livestock, the focus is on pigs because they are especially affected by heat stress since they do not have functioning sweat glands amongst other reasons. Heat stress risk should be high on the agenda for Uganda as the pig sector is highly important.

Mr. John presented data from the climate modelling, projections and risk mapping, and the potential repercussions for pig sector in Uganda. Most of North-Western Uganda already experiences heat stress conditions. Currently, the likelihood of exposure to heat stress is high between December - March. Based on model projections, severe heat stress conditions will be dominant throughout the country with over 90% of the districts experiencing severe heat stress conditions by 2100. Pork production in Uganda will be significantly challenged by increasing frequency of heat stress. All stages of the pig value chain and all value chain actors including men, women and youth will be negatively affected.

Dr. Birthe returned to present outputs from a [stakeholder workshop](#) in February 2020 in Kampala, where partners scored expected risks of heat stress from moderate to major and severe. Risks span across all stages of the value chain from input, on-farm production, transport to output, and all value chain actors including men, women and youth will be impacted. Coping and adaptation strategies exist, with coping strategies being flexible and easy to promote

within the local context, and adaptation strategies requiring collective effort by stakeholders as they enable heat stress mitigation in the long term. Uganda has put in place a set of policies and plans to support climate change adaptation, but challenges remain:

1. Piggery is often not among the priority strategic commodities.
2. Adaptation policies, strategies, action plans and measures at both national and local levels do not specifically refer to mitigating climate-induced heat stress in pigs.
3. Where key stakeholders have made progress in joint development of related policies, strategies and plans, a gap still exists in joint implementation.

Dr. Birthe outlined options for concerted action by all stakeholders, including production and value chain levels, researchers, policy makers and investors. Concluding the heat stress science briefing, they summarized key take home messages:

- Pigs are especially vulnerable to heat stress due to their physiological characteristics
- Climate-induced heat stress reduces pig growth, reproduction and health and may cause animals to die – heat stress is among the most severe expected impacts of climate change on livestock
- Risk factors that increase heat stress include breed, management system and physiological stage
- Model predictions point to an increase of 1.5-3.5°C in temperature and 4-7% in relative humidity in future
- Heat stress levels are high and likely to further increase in the future - based on climate model projections, over 90% of districts will experience severe heat stress conditions by 2100
- 30% (39,000 tons) of current pork production is under threat due to heat stress in future based on pessimistic scenario (RCP 8.5)
- Risks span across all stages of the pig value chain from input supply to on-farm production, transport and output market – with men, women and youth affected differently
- Uganda has put a set of policies and plans in place to support climate change adaptation, supported by various stakeholders, but challenges remain
- Policy options for concerted action by all stakeholders are available

More information on the heat stress science briefing can be found in PowerPoint presentation (<https://hdl.handle.net/10568/110539>) as well as the policy brief (<https://hdl.handle.net/10568/110342>).



Photo 7: Mr. Robert Suuna of Excelhort Consulting commenting and asking questions after the science briefing (Credit: CIAT/ILRI)

Comments on science briefing and question from participants

- From the policy recommendations made under coordinated cross sectoral cooperation at local and national level, it was recommended that the department responsible for water supply at the Ministry of Water and Environment (MWE) should continue to invest in infrastructure for effective water distribution to address the water scarcity among pig farmers. However, MAAIF was missed out yet the mandate for supplying water on farm lies with MAAIF, thus it would be good to include MAAIF in the recommendations.
- Presentations on statistics by John emphasized the relevance of the pig sector, however the NDP-III does not mention pigs anywhere, but only refers to goats and beef under livestock. The Commissioner at MAAIF has already assured that pork shall be included under meat.
- The alignment of the different sector documents needs to be addressed through the commissioner's office at MAAIF. The sector strategic plan for agriculture may put emphasis on the pig sector but there is less emphasis when it escalates to the higher level of NDP-III. The core program to address climate change mentions tree planting, water supply, resilient communities with emphasis on the cattle corridor, yet pigs have no corridor despite agricultural zones in Uganda that do have areas of high pig production suitability.
- The Agriculture Sector Strategic Plan (ASSP) is the sector working document that operationalized in detail, what has already been provided for in the NDP-III. Within the ASSP are details for all the commodities.
- Looking at the effect of heat stress across the value chain in Uganda, there are some off-farm activities that fall outside the scope of MAAIF, especially in the transport and output market sector and this fall under the Ministry of Trade, Industry and Cooperatives (MTIC). In addition, some farmer groups fall under MTIC because of their identity as cooperatives. In this document, there is no mention of MTIC, yet it plays a role in the transformation of the agricultural sector. Is it possible to include MTIC in this document?

Dr. Birthe and Mr. John informed the participants that policy options were derived from the stakeholder consultation workshop held in February 2020, but the documents can be updated to especially include the roles and responsibilities of MAAIF and MTIC.

Panel discussion

The panel discussion involved sharing practical experiences and perspectives on climate-induced heat stress in pigs. The panelists included: i) Dr. Deogracious Wonekha from MAAIF, ii) Mr. Derrick Senyonga from MWE, iii) Dr. Joshua Zake from Environment Alert and iv) Dr. Emma Naluyima from the National Pig Multi-Stakeholder Platform. Other participants were involved in the session through interactive comments, questions and responses.

Challenges

Panelists and participants discussed the challenges in the pig value chain according to their experiences. In a number of cases, stakeholder representatives made comments on how they are addressing particular challenges.

Climate change was a central issue discussed by the panelists and participants. Climate change impacts the productivity health and reproductive performance of pigs. Temperature increase associated with climate change is likely to cause heat stress to livestock. Increase in carbon-dioxide level can affect composition of pasture and lead to increase in livestock diseases. Climate change leads to unavailability of inputs, for example, the pigs may not have enough maize to eat. This means that the pigs will be prone to diseases, they are stressed which leads to increased veterinary service costs.

Fertility problems exist with cases involving pigs that are infertile, boars that are not serving small litter sizes, despite the fact the pig breeds are good. There is low use of Artificial Insemination (AI) although this can bring breeds closer to farmers and help to mitigate effects of heat stress. Currently, 52% of pig farmers do not keep a boar, so they are obliged to move their sows over distances during their breeding time. Makerere University (MUK) runs the biggest boar stud in Uganda with support from NAGRIC. MUK provides AI services with 140 inseminators serving 3500 farmers. There is also

need to do breeding research, for identifying breeds adaptable to environment. There is need for MAAIF to build capacity in breeding, specifically in AI for pig, similar to what is done for dairy. A MAAIF representative informed participants that there is building the capacity of extension workers through training them on AI and since these services are demand driven-they can be provided.



Photo 8: Prof. Donald Kugonza asking a question to the panelists (Credit: CIAT/ILRI).

Another challenge is increased pests and emerging diseases, even in areas not known to have pest. There is reduced feed production and availability witnessed in the field. As most farmers are smallholder in nature, their own food production may compete with pig feeds. In case of food shortage, the pigs are sacrificed.

Water availability is a big concern, as water sources have dried up and the cost of extending water availability is quite high. MAAIF representative informed participants that MAAIF and MWE have a cost sharing initiative to address water scarcity through units for hire by farmers to boost water for production.

Farmers are carrying out intensification practices as a means to address heat, yet previously pigs used to roam around according to their natural preference. Intensification comes with challenges like increased cost of housing, unfavorable environment for pigs if house is built using cement, use of labor-saving technologies. The housing currently used affects the behavior of pigs and can cause stress to them.

For traders, transport of purchased pigs is a challenge in face of climate change considering the heat during the day, increasing the cost of transportation. A small car or a motorbike is commonly used during transportation, and water is not provided to pigs. The cattle traders license was raised as an issue since these are individual licenses and not available for companies. In some instances, actors witness lack of issuance of licenses and their enforcement. MAAIF representative commented on this issue highlighting that permits are like IDs, thus institutions will have to identify particular individuals to hold permits. Another challenge related to transport is the high cost of movement permits. The law provides for a movement permit for any animal being moved, which has a timeframe and should not be moved at night. A discussion ensued that suggested that permits are being used for raising revenues instead of surveillance, leading to high transaction costs for pig transportation, primarily because pigs are not allowed to move at night. MAAIF representative informed participants that MAAIF charges pricing fees and local governments are the ones charging for permits as part of local revenue. MAAIF is looking at putting in place a harmonized permit fee.

Access to veterinary services is also hard as there are few vets within sub-counties. There was concern that pigs have no inspectors for the produced meat. There is no government regulated abattoir for pigs outside of Kampala which sometimes leads to trading in infected pork. Participants were informed by MAAIF representative that extension workers

are recruited according to demand at community level and monitoring is done by district teams. There is lack of facilitation to share expertise with the last miles users, the farmers.

Small scale investors are curious to have data on numbers of pigs for example for sows with in the nation to make informed decision making when investing. There was also concern where UBOS and MAAIF get all the data that they present.

There are a lot of climate financing options but concern is on how communities can link into and benefit from the global climate funds. The MWE representative informed participants that climate change funds are available and a number of entities have benefited like the Clean Development Mechanism (CDM) projects. The Internationally Transferred Mitigation Outcomes (ITMOS) are being on boarded and entities can take these on. The country is getting ready to implement the REDD+ initiatives.

Vulnerability and risk

At global level, Uganda is more vulnerable to heat stress as a country compared to the western countries. From a value chain perspective, the entire pig value chain will be hit; however, the farmer is put at pressure to produce, yet there are smallholders, and there are competing needs between human food and pig feed that often make adaptive measures unaffordable.

Amongst the different scales of operations by farmers, the smallholder pigs are most affected, and three quarters are women. When their pigs die, it means that lose potential nutrition and income. This also affects payment for education for their children, since the funds often come from pig sales.

In general, the research estimates that 30% of our pork production might be at risk which will impact the economy at large, making households more vulnerable. When communities become more vulnerable, they may begin to encroach on wetlands to find means of survival.



Photo 9: Dr. Deogracious Wonekha from MAAIF responding to questions during the panel discussion (left), with Dr. Joshua Zake from Environment Alert listening (Credit: CIAT/ILRI).

Opportunities for action for policy, NGOs and other stakeholders

From the MAAIF perspective, MAAIF is one of the most networked ministries of government, with extension workers up to sub-county level with technical expertise. MAAIF holds the water for production mandate and water is critical, especially with increasing climate-induced heat stress. Generally, MAAIF has the infrastructure and expertise. MAAIF has started registration and profiling farmers involved in production of pigs to track and better support them. Most of the recommendations in the Agriculture Sector Strategic Plan (ASSP-2) that arose from research have been captured and include: promoting a streamlined breeding programme, strengthening advisory services, institute a regulatory framework to guide to pig industry, promotion of research in pig production, and promote establishment of marketing infrastructure. MAAIF is also identifying breeding technologies for adaptation, through NAGRIC, appropriate breeds that can adopt to climate change are being sought. The National Agriculture Research Organization (NARO) which is under MAAIF is also carrying out research in livestock and crops and selection of appropriate technologies.



Photo 10: Mr. Derrick Senyonga from MWE responding to questions during the panel discussion (Credit: CIAT/ILRI).

MWE and MAAIF jointly came up with the National Adaptation Plan for the Agriculture Sector (NAP-Ag), putting forward strategies to address and adapt to climate change impacts. The United Nations Framework Convention on Climate Change (UNFCCC) calls upon countries to submit Nationally Determined Contributions (NDCs) under the Paris Agreement that Uganda signed, and under the NDCs submitted in 2015 the agriculture sector is highlighted both for adaptive and mitigative measures. The NDC has conditional and non-conditional targets, and includes adaptation measures that address heat. In line with Paris agreement, it calls for transparency, meaning that all actions in NDC have to be monitored, reported and verified. This process calls for development of a national Measurement, Reporting and Verification (MRV) framework. The framework requires development of tools to track adaptation action that focus on pigs, which should be reported on and verified at both national and international level. The MRV tool brings on board all stakeholders and support for the update of the NDC. There are also standard climate change indicators which shall be assessed at both national and local level. These indicators will be linked to the MRV framework so that mitigation and adaptation action that will be presented are monitored. With support from GIZ and UNDP, the NDC is updated and a long-term strategy for climate change is developed. The climate change policy from 2014 provides for a number of adaptation strategies to reduce heat stress although the strategies are not specific to pigs. As suggestion, MWE in collaboration with partners can come up with a list of strategies aligned to NDCs and NAP-Ag that can be adapted to address heat stress from January 2021, fed with recommendations from research.



Photo 11: Dr. Joshua Zake from Environment Alert (middle) responding to a question, with dr. Deogracious Wonekha from MAAIF (left) and Dr. Emma Naluyima from the National Pig Multi-Stakeholder Platform (right) listening during the panel discussion (Credit: CIAT/ILRI).

Opportunities exist for the Non-Government Organizations (NGOs) as highlighted by Dr. Joshua Zake of Environment Alert. Environment Alert's aspiration is advancing community-based activities and promoting appropriate enterprise development for poverty reduction. Environment Alert wants landscapes restored in terms of forest and wetland cover. Pig production provides an alternative livelihood as means of reducing pressure on the environment. There are opportunities that can be got from existing policy frameworks, e.g. NGOs need to be part of NAP-Ag implementation and should find a way of addressing gaps along the value chain. The NDC reporting is on-going, some of the emerging issues from the study can be considered. There is a need for collaboration of actors along the value chain, responsive training and awareness, community adaptation through pilots and through models and through research. NGOs need to find ways of better utilizing information from research. Policy dialogue should include more actors as they have different competencies and can supplement on policy formulation.



Photo 12: Dr. Emma Naluyima (in blue jacket) responding to questions during the panel discussion (Credit: CIAT/ILRI).

Dr. Emma Naluyima of the National Pig Multi-Stakeholder Platform listed opportunities for action for farmers and farmer platforms/networks. Farmers need to deal with housing, supported by technical input from research. Farmers and students should be taught to cater for ventilation and aspects related to roofing. Pig farmers should be encouraged to plant trees around the farms, since shelter and shade is needed. Irrigation in form of water for production is necessary, and rain water harvesting and storage for future use is important. Farmer groups can be organized and taught on what to do and later helped with access to finance. Research and technology for example hydroponics are needed Integrated farming is also needed, such that one enterprise supports another enterprise. MAAIF should think critically about the mode of transport since pigs cannot move during the day since its very hot, alternatively, special cars for transporting pigs can be developed and provided. The quality of meat is affected when pigs are slaughtered under stressed. There are few abattoirs in the country which makes it hard to slaughter pigs to ensure good quality pork. Site location is key since this affect ventilation, in addition to agro-forestry tree planting and the type of flooring - concrete floors or slabs are good for coping with varying temperature.



Photo 13: Hon Mathias Kasamba asking a question to the panelists (Credit: CIAT/ILRI).

Tree planting along the entire value chain should be promoted, and agro-forestry integrated with livestock, for example jackfruits which are highly nutritious. It is suggested that we must put in place a mechanism that every school must have a nursery bed for all the fruits in that community with support from MWE, MAAIF and other agencies.



Photo 14: Mr. Enock Nimpamya asking a question to panelists (Credit: CIAT/ILRI).

It was suggested that an association should be formed to deal with issues across the pig value chains and create awareness to the public and to the enforcers. The National Pig Multi-Stakeholder Platform representative informed participants that there is already an organized group of farmers and stakeholders.



Photo 15: Mr. Richard Semwanga asking a question to panelists (Credit: CIAT/ILRI).

A representative from a young farmers network suggested to promote pig production as a solution for youth unemployment issue. Pig production would be a good venture for youth because it offers high return within a short time.



Photo 16: Mr. Philip Borrel of Breeds, Feeds and Meats Uganda Ltd. asking a question during the panel discussion (Credit: CIAT/ILRI).

It was suggested that there is need to integrate climate change adaptation with mitigation in the pig sector. We do not want the pig sub-sector to be looked at as the dairy or meat cattle sector for producing a lot of greenhouse gas emissions (GHGs). A mitigation measure for GHGs is to collect the manure to make biogas so that methane is not produced in the atmosphere but is used to produce electricity.

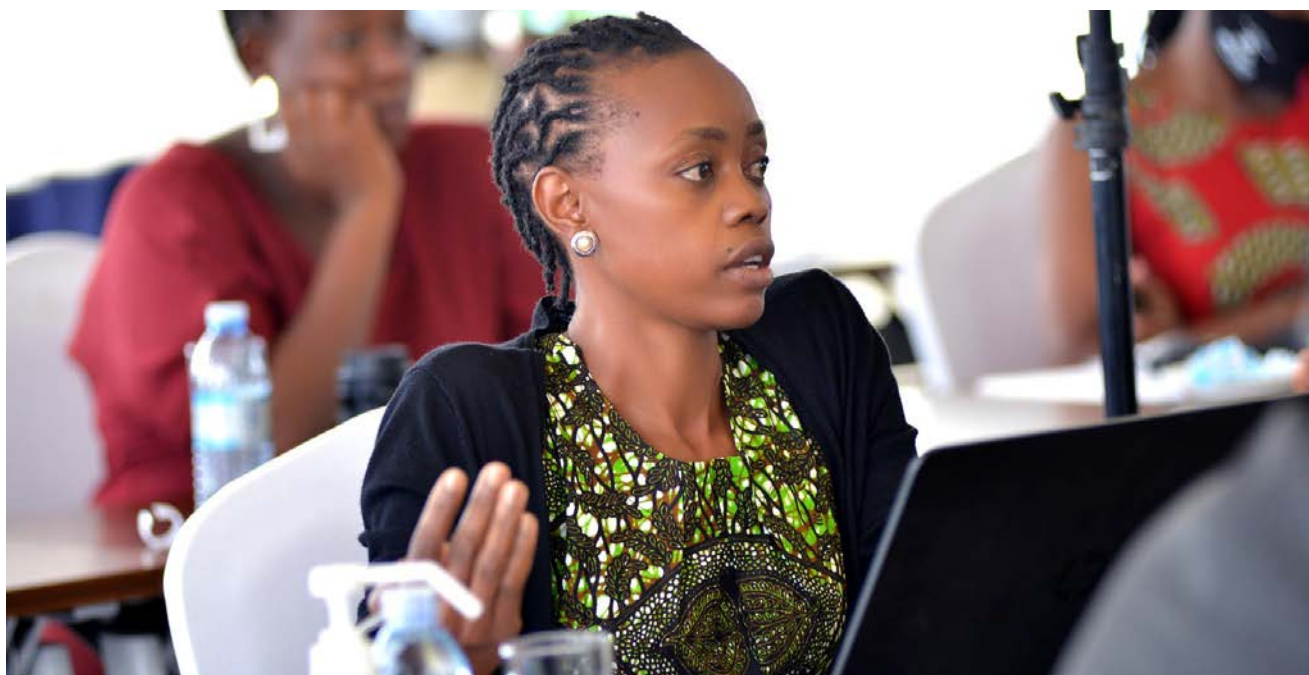


Photo 17: Ms. Susan Nandudu asking a question to panelists (Credit: CIAT/ILRI).

In general, it was suggested that there is an opportunity for multi stakeholder involvement. Other disciplines should be involved for example in designing appropriate pigsties. The findings from this study can inform the next assessment report of the Intergovernmental Panel on Climate Change (IPCC) on details around heat stress, and on how to adapt to climate change in the pig enterprise. We need to engage at higher level to ensure contribution of the sector to national goals.



Photo 18: Dr. Atuhaire giving his remarks in regards to actions and commitments (Credit: CIAT/ILRI).

Actions and commitments

No.	Representative and Institution details	Pledges, actions and commitments
1.	Dr. Julius Okello, Team Leader Infrastructure, Prime Minister Delivery Unit-Office of the Prime Minister (OPM)	<ul style="list-style-type: none"> • Share a synthesized report for high-level action by OPM, and recommendations from the study and actionable interventions from the forum, and share these challenges with the OPM so planning for implementation can start. • We put pressure to sectors to deliver on their mandate as planned and with budget. • OPM will fast track and support implementation of water for production together with MAAIF. • The Delivery Unit will support the whole adaptation as presented in the workshop (and listed on the last page of the policy brief), by ensuring that they support the sectors to deliver on their mandate. • Joint brief meeting with prime minister focusing on various value chains.
2.	Dr. Juliet Sentumbwe, Commissioner Animal Production and Ag. Director Animal Resources at Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	<ul style="list-style-type: none"> • MAAIF pledges to be with you and do what it can to push the agenda forward. • MAAIF's mandate is on policy action so MAAIF to work on the revision of policies and regulations to improve and include all livestock types including pigs. • Some of laws and regulations are outdated, certain revisions need to be made, for example, the cattle trader's license, which excludes pigs. • Animal Disease Act that governs most of the issues has been discussed. MAAIF already is in the process of revising it. MAAIF pledges to play her part, specifically on policy and legal frameworks that governs the sector using the facilitation available. • MAAIF hopes to have more engagement of a similar nature with many other stakeholders. There is a challenge of funding since there is a lot of stakeholder involvement in formulation of these policies and legal frameworks. One cannot pass cabinet secretariat for approvals if you have not had a thorough stakeholder analysis. • Guidelines/standards/regulations on assistance for implementation of livestock systems like transportation/ structures/processing facilities guidelines. • For transportation vehicle, MAAIF needs to provide the specification and standards of the truck for different livestock. MAAIF is supposed to set standard and provide models such that the private sector can produce and multiply them for use.

No.	Representative and Institution details	Pledges, actions and commitments
		<ul style="list-style-type: none"> • MAAIF promised to follow up to ensure that guidelines are uploaded on the website and be available to everybody. • Regarding abattoirs, MAAIF will recommend abattoirs to be set up close to locations where livestock are, such that transportation costs and movements are minimized and the product is safer. Cold storage equipment are also key for abattoirs. MAAIF will provide guidelines for investors that intend to set up abattoirs. • Regarding inspectors, MAAIF pledges to handle this issue to ensure that all kind of livestock are inspected for wholesomeness and for safety. • Regarding breeding pigs, MAAIF has challenges in proving breeding service in the country, and NAGRIC is also aware of these challenges. MAAIF pledges to support capacity building for livestock other than cattle. • With support from FAO, MAAIF is developing different animal feed balance sheets for different animals. This will help us to know what feeds are available and where. Currently, there are funds to start this, but we will need support from the private sector and from other partners updating the sheets. • MAAIF shall continue promoting the interface with between the scientists, stakeholder and policy makers which is necessary to make informed decisions. • The information generated by scientist on heat stress adaptation should be cascaded to the community, taking into consideration local language and needs of the of the intended beneficiaries. • In regards to one stop information centre, MAAIF has a web based system with relevant information and data that is being designed. MAAIF website will be more active.
3.	Hon. Mathias Kasamba, Member of Parliament, Chairperson of the Committee on Agriculture, Tourism and Natural Resources, East African Legislative Assembly (EALA)	<ul style="list-style-type: none"> • Personally he pledges to improve and re-activate his piggery unit. • He is ready and available to champion any policy to work in Uganda and in the region. • He wants to champion jackfruit growing and committed to plant 5 million jack fruit trees.

No.	Representative and Institution details	Pledges, actions and commitments
4.	Mr Philip Borel, Managing Director of Breeds, Feeds and Meats Uganda Limited	<ul style="list-style-type: none"> • Discussion to setup a data capturing system at the farm, to capture data on temperature based on observations and associated impacts on production and reproduction . • Already setting a training tool for training farms to help in breeding, feeding and will as well integrated critical aspect temperature management. • To study and eventually invest in biogas production from pig manure and utilization system based and adapted on the volume of manure produced per year.
5.	Charles Tumuhe - extension worker and agriculturalist	<ul style="list-style-type: none"> • Pledge to encourage pig farmers to design their pigsties for proper insulation and teach them on tree growing on farm to provide more shade to pigs • Will be available to support any research for selecting heat stress tolerant pigs in his locality
6.	Prof. Donald Kugonza, Associate Professor, Makerere University	<ul style="list-style-type: none"> • Will support the streamlining of this knowledge into the curriculum specifically in reproductive technologies and advancement. • Support research in the pig enterprise in collaboration with research organizations and researchers.
7.	Ms. Sarah Mujabi, Programme Officer Climate Change, UNDP	<ul style="list-style-type: none"> • Make sure that agriculture has been prioritized as a sector contributing to the NDC. • UNDP supportst the inclusion of the monitoring indicators associated with pig enterprise, productivity and GHG emissions in the current NDC update.
8.	Dr. Emma Naluyima, Chairperson, National Pig Multi-Stakeholder Platform	<ul style="list-style-type: none"> • Share information from the MAAIF with stakeholders.
9.	Mr. John Illukor (online participant), Economist, World Bank	<ul style="list-style-type: none"> • As the World Bank we are developing Climate Smart Project for Uganda and currently we are supporting MAAIF in developing the data system. Available for discussion to see how to integrate latest research insights.
10.	Dr. Joshua Zake, Executive Director, Environment Alert	<ul style="list-style-type: none"> • Share the policy briefs with members of the CSOs through their respective google groups (i.e. ENR-CSO network, Prolinnova Uganda Country Platform, Uganda Forest Working Group). • Upload the policy brief on the Environmental Alert and ENR-CSO network websites for wider circulation and future retrieval as we pursue structured engagements with partners on this initiative.
11.	Media representatives	<ul style="list-style-type: none"> • Pledged to join a field trip to cover heat stress at farms when invited. Media are interested to see, observe and record real heat stress happening in pigs in Uganda and as well interview first hand the farmers.

No.	Representative and Institution details	Pledges, actions and commitments
12.	Mr. Derrick Senyonga, Senior Climate Change Officer, Ministry of Water and Environment	<ul style="list-style-type: none"> MWE in collaboration with MAAIF to come up with NAP for agriculture that lists a number of strategies that can be adapted to address heat stress. This process might begin in January in giving their input, such that the recommendation from research can be aligned to the NDC
13.	Dr. Andrew Atuhaire Mwebaze, Researcher, NALIRRI	<ul style="list-style-type: none"> NALIRRI's mandate is to do research in livestock. NALIRRI shall do more research in housing, breeding, nutrition for livestock as these affect productivity of pigs in particular.
14.	Ms. Elisabeth Nsimadala – the President of Pan African Farmers Association (PAFO) and Eastern Africa Farmers Federation (EAFF)	<p>PAFO and EAFF are going to create awareness and information dissemination on adaptation strategies to our farmers and on the policy recommendation using our structure.</p> <p>PAFO and EAFF will join the livestock stakeholder platform.</p> <p>PAFO and EAFF are promoting an e-extension with support from Uganda Communication Commission and specifically on digital literacy so will integrate the message.</p>



Photo 19: Ms. Elisabeth Nsimadala of PAFO and EAFF giving the closing remarks (Credit: CIAT/ILRI).

Closing remarks

Ms. Elisabeth Nsimadala – the President of Pan African Farmers Association (PAFO) and Eastern Africa Farmers Federation (EAFF) gave the closing remarks.

The outputs from this workshop will contribute to the overall MorePork program under the CGIAR Research Program on Livestock aimed at developing and testing an environmentally sustainable and gender inclusive integrated intervention packages to improve pig productivity and incomes of value chain actors. This policy briefing is part of an upcoming multi-stakeholder learning series around livestock and climate change. More learning series are scheduled in collaboration with the Program for Climate Smart Livestock Systems (PCSL) and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) that supports interventions to increase the contribution of livestock to the three key pillars of Climate Smart Agriculture (CSA).

ANNEX

ANNEX I: Agenda

Time	Item	Presenter
8.00 – 8.30	<i>Arrival and registration</i>	
8.30 – 9.00am	Welcome: Objectives of the event, agenda	Facilitator Dr. Maria Nasuna-Musoke
9.00 – 9.30am	High-level opening address: Livestock and climate change – why the pig sector needs to adapt to heat stress now	Hon. Mathias Kasamba, Member of Parliament, Chairperson of the committee on Agriculture, Tourism and Natural Resources, East African Legislative Assembly (EALA); Dr. Julius Okello, Team Leader Delivery Unit, Office of the Prime Minister; Dr. Juliet Sentumbwe, Commissioner Animal Production and Ag. Director Animal Resources, MAAIF
9.30 – 10.30am	Science briefing: Reducing climate-induced heat stress in pigs in Uganda – insights and key messages from research	Dr. Ben Lukuyu, senior scientist and lead MorePork, ILRI; Dr. Birthe Paul, scientist and Mr. John Mutua, senior research associate, Alliance Bioversity International and CIAT
	<i>10.30 – 11.15am Coffee break</i>	
11.15 – 12.15am	Panel discussion: Practical experiences and multi-sector perspectives on climate change adaptation in pigs	Dr. Deogracious Wonekha, Senior Veterinary Officer, MAAIF; Mr. Derrick Senyonga, Senior Climate Change Officer, MWE; Dr. Joshua Zake, Director, Environment Alert; Dr. Emma Naluyima, Chairperson, National Pig Multi-Stakeholder Platform
12.15am – 12.45pm	Solutions for beating the heat: Action and commitments for various actors	All participants and online
12.45 – 13.00	Closing session, next steps	Facilitator, CGIAR, Ms. Elisabeth Nsimadala, President of Pan African Farmers Association (PAFO) and Eastern Africa Farmers Federation (EAFF)
	<i>1.00 – 2.30 Lunch</i>	

Annex 2: Media advisory

Climate induced heat stress in pigs will require joint action to protect and sustain the pig industry in Uganda for years to come

Golden Tulip Hotel, Kampala, Uganda

8:30am–1:00pm, 10 December 2020

Kampala, Uganda, 10 December 2020 _ Science experts and policy makers will be gathering to discuss important key findings and insights on the impact of heat stress on livestock in Uganda, particularly pigs, as a result of climate change. Focus will be on the challenges as well as opportunities for partnership, coordinated actions and the promotion of coping and adaptation measures to help government and private actors meet the development goal of sustainably empowering farmers and improving their income.

Pig farming is a profitable enterprise in Uganda. However, the pig sector could face substantial disruption as a result of rising global temperatures and humidity. Pigs are particularly vulnerable to these effects due to their smaller lungs and inability to sweat.

Model projections and spatial analysis developed by scientists at the Alliance of Bioversity and CIAT predict that severe heat stress conditions will be dominant throughout the country, with over 120 of Uganda's 134 districts experiencing progressive heat stress conditions in the coming years. Currently, quantitative information on the impact of heat stress on productivity and economic losses is not available in Uganda. In the U.S., however, it is estimated that heat stress in the pig industry is responsible for about US\$1 billion in annual losses.

Policymakers, private sector actors and other stakeholders have a unique opportunity to act early and jointly to support and protect the pig industry by leveraging available and new strategies to mitigate heat stress in pigs.

WHAT: Beating the Heat: Briefing on actions to reduce climate-induced heat stress in pigs in Uganda

WHEN: Thursday, 10 December 2020, 8:30AM – 1:00PM

WHERE: Golden Tulip Hotel, 12B Kafu Road, Kampala, Uganda

Or join virtually:

This event is the first of a multi-stakeholder learning series around livestock and climate change. It is jointly hosted by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Ministry of Environment and Water (MWE), together with the [Alliance of Bioversity International and CIAT](#) and the [International Livestock Research Institute \(ILRI\)](#) as part of their [joint country program](#) research to sustainably develop the pig sector in Uganda.

High level attendees will include:

- **Dr. Julius Okello**, Team Leader Delivery Unit, Office of the Prime Minister
- **Hon. Mathias Kasamba**, Member of Parliament of the East African community and Chairman for Agriculture and Natural Resources
- **Dr. Juliet Sentumbwe**, Commissioner Animal Production and Ag. Director Animal Resources, MAAIF

Panel experts include:

- **Dr. Deogracious Wonekha**, Senior Veterinary Officer, MAAIF
- **Mr. Derrick Senyonga**, Senior Climate Change Officer, MWE
- **Ms. Sarah Mujabi**, Program Officer Climate Change, UNDP
- **Dr. Joshua Zake**, Director, Environment Alert

- **Dr. Emma Naluyima**, Chairperson, National Pig Multi-Stakeholder Platform

For more information, please contact:

Paul Zaake (Alliance of Bioversity International and CIAT): 0759 260 260; zaakepaul@gmail.com

Pamela Nabukenya Wairagala (ILRI): +256 776 833 457; pwairagala@cgiar.org

Related reading

- Policy brief: [Reducing climate-induced heat stress in pigs in Uganda: Policy actions \(cgiar.org\)](#)
- Blog: [Taming heat stress – climate change adaptation of pig and dairy sector in Uganda](#)
- Blog on More Pork program: [An integrated package to build stronger market systems in Uganda's Pig Value Chain](#)



Picture 20: Ms. Navvuga Peace a journalist from Bukedde TV at the event (Credit: CIAT/ILRI).

Annex 3: Selected media uptake

Journalists from the following media houses were invited to attend and cover the event::

1. Uganda Radio Network
2. Bukedde TV and print
3. New Vision
4. Record TV
5. Baba TV
6. UBC TV
7. UBC Radio
8. New Vision
9. Daily Monitor
10. BBS TV

The event received wide media coverage in both print and electronic media. Selected media coverage included the following:

1. New Vision
<https://www.newvision.co.ug/news/1535238/climate-change-piggery-profitable>
2. Daily Monitor
<https://www.monitor.co.ug/uganda/news/national/climate-change-to-hurt-pig-rearing-scientists-warn-3226090>
3. The Independent
<https://www.independent.co.ug/heat-stress-makes-ugandan-pigs-impotent-kills-250000-per-year/>
4. Uganda Radio Network (URN)
<https://ugandaradionetwork.net/story/heat-stress-makes-ugandan-pigs-impotent-to-kill-250000-per-year>

Uganda Radio Network supplies news to various radio stations across the country. However, the article will be available to the public online after two weeks.

The event was promoted on social media, specifically on Twitter through the @Livestock_CGIAR as the main handle using the hashtags **#BeatingtheheatUG** and **#MoreporkUG**.

ANNEX 4: Participants list

No	Name	Position	Institution
1.	Dr. Andrew Atuhaire Mwebaze	Researcher	National Livestock Resources Research Institute (NaLIRRI)
2.	Dr. David Nsubuga	Senior Veterinary Officer	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
3.	Dr. Emma Naluyima	Chairperson	National Pig Multi-Stakeholder Platform
4.	Dr. Joshua Zake	Director	Environment Alert
5.	Dr. Juliet Sentumbwe	Commissioner Animal Production and Ag. Director Animal Resources	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
6.	Dr. Julius Okello	Team Leader Infrastructure	Prime Minister Delivery Unit (PMDU)-Office of the Prime Minister
7.	Dr. Deogracious N. Wonekha	Senior Veterinary Officer	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
8.	Hon. Mathias Kasamba	Member of parliament at EALA Chairperson of the committee on Agriculture, Tourism and Natural Resources	East African Legislative Assembly (EALA)
9.	Mr. Christopher Mulindwa	C.E.O	Pig Production and Marketing Uganda Limited
10.	Mr. Dennis Maholo	Senior Pasture Agronomist and Climate Change Task Force member	Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
11.	Mr. Derrick Senyonga	Senior Climate Change Officer	Ministry of Water and Environment (MWE)
12.	Mr. Enock Nimpamyia	Chairperson	Coalition on Environment & Climate Change in Uganda
13.	Mr. Richard Semwanga	Chairperson	Uganda National Young Farmers Association (UNFYA)
14.	Mrs. Sarah Mujabi	Program Officer Climate Change	United Nations Development Programme (UNDP)
15.	Ms. Elisabeth Nsimadala	President	Pan Africa farmers Organization (PAFO)
16.	Ms. Susan Nandudu	Executive Director	African Center for Trade and Development (ACTADE)
17.	Prof. Donald Kugonza	Lecturer	Makerere University
18.	Ms. Neema Nagadya	YPARD Ambassador	Young Professionals for Agriculture Development (YPARD)
19.	Mr. Robert Ssuuna	Value Chain Development Specialist	Excelhort Consult
20.	Mr. Philip Borel	Managing Director	Breeds feeds and meats Uganda Ltd
21.	Ms. Jackie Nantale	Reporter/Journalist	Record TV

No	Name	Position	Institution
22.	Mr. Isaac Tenywa	Reporter	BABA TV
23.	Ms. Pamela Mawanda	Journalist	URN
24.	Mr. Gerald Tenywa	Journalist	New Vision
25.	Ms. Peace Navvuga	Reporter	Bukedde TV
26.	Mr. George Kibiike	Executive Director	CRIP
27.	Mr. Chris S. S	Reporter	BBS TV
28.	Ms. Sylvia Kahulabe	Photojournalist	New vision
29.	Mr. Clement Wangira	Reporter	UBC TV
30.	Mr. Julius Muhumuza	Reporter	Dream TV/Impact FM
31.	Mr. Innocent Kayizo	Reporter	Galaxy FM/ ABC Africa News
32.	Mr. Paul Zaake	Consultant	Alliance Bioversity and CIAT
33.	Mr. Isaac Rubayiza	Climate Change Officer	MWE/CCD
34.	Ms. Susan Atare	Accounts Analyst	Alliance Bioversity and CIAT
35.	Ms. Susan Atwinirebyoona	Officer	Alliance Bioversity and CIAT
36.	Ms. Pamela Wairagala	Communications Officer	ILRI
37.	Mr. Roland Mugumya	P.S.S- PCSL	ILRI
38.	Mr. Ambrose Atuhaire	I.T	ILRI
39.	Dr. Birthe Paul*	Scientist	Alliance Bioversity and CIAT
40.	Mr. John Mutua*	Senior Research Associate	Alliance Bioversity and CIAT
41.	Ms. Laura Cramer*	Science Officer	ILRI
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47.	Ikara Aloysius Ronnie*		
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51.	Masereka Charles Yoronimu*		
52.	Mbogo Ivan*		
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Photo 21: Members of the co-organising team, Paul Zaake (left) and Isaac Rubayiza (right) taking notes at the workshop (Credit: CIAT/ILRI).



Photo 22: Members of the co-organising team, Ms. Susan Atwinirebyoona (left) and Ms. Susan Atare (right) at the workshop (Credit: CIAT/ILRI).

Annex 4: Further reading

- [A methodology for mapping current and future heat stress risk in pigs | animal | Cambridge Core](#)
- [Heat stress assessment stakeholder consultation in Uganda: Workshop report \(cgiar.org\)](#)
- [An assessment of heat stress status in pigs and adaptation options in lira district Uganda \(cgiar.org\)](#)
- [Report and outputs on pig heat stress research in Lira District - Uganda \(cgiar.org\)](#)
- [Reducing climate-induced heat stress in pigs in Uganda: Policy actions \(cgiar.org\)](#)



Photo: Kabir Dhanji/ILRI



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This report was conducted as part of the CGIAR Research Program on Livestock and is supported by contributors to the CGIAR Trust Fund. CGIAR is a global research partnership for a food-secure future. Its science is carried out by 15 Research Centers in close collaboration with hundreds of partners across the globe. www.cgiar.org/funders