



Non-conventional livestock species production for food security in Cameroon: Recontextualising understandings of animal welfare, ethics, and trade-offs – A transdisciplinary interactive approach

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Non-conventional livestock species production for food security in Cameroon: Recontextualising understandings of animal welfare, ethics, and trade-offs – A transdisciplinary interactive approach

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Abstract

Non-conventional livestock (NCL) species including cavies, grasscutters (also dubbed as cutting-grass), and guinea fowls contribute to a rising percentage of West and Central Africa's population's diet. Despite their importance, scanty empirical evidence exists regarding (i.) trade-offs in their value-chain, (ii.) zoonotic risks in their consumption and (iii.) animal welfare issues. To address these knowledge gaps, an international transdisciplinary symposium was held at the University of Dschang, Cameroon. The aim was to identify available knowledge, discuss research gaps and develop framework ideas for sustainable production of NCL species. A World Café approach was used to facilitate discussions with 35 participants from academia, policy makers, farmers, and students. As a result, a three-pronged approach was proposed. Firstly, the need to understand local contexts and establish compatible and workable principles of animal welfare and ethics. Secondly, the need for implementation, enforcement and revision of already existing policies and institutions guiding the sustainable production of NCL species. Thirdly, promoting the role of academia to address research gaps, strengthen collaboration with extension agencies to disseminate knowledge and minimize the gap between researchers and farmers. The outcomes highlight the importance of creating a

framework which minimizes the trade-offs and risks of disease infection and promotes better practices for improved quality of products without undermining ethical principles that support sustainable development.

Keywords: Non-Conventional Livestock; Sustainable Production; Food Security; World Café; Animal Welfare; Value Chain; Cameroon

Introduction

While some livestock species are commonly acknowledged to be raised for classical agricultural purposes, others are largely overlooked because their role in food security remains poorly recognised under public policy frameworks. Livestock in this category are termed as non-conventional. However, on the African continent, non-conventional livestock, such as rabbits, domestic cavy (known as guinea pigs), native land snails, grasscutters (also dubbed as cutting-grass) and guinea fowls contribute to food security through provision of food, fibre and other agricultural products (Kale et al., 2016; Lammers et al., 2009). They are demonstrated to improve household food security as they have economic benefits such as higher per kilo price of meat and eggs in comparison to other conventional species, thus making them economically profitable for indigenous communities (Kale et al., 2016; Yeboah, 2009). Furthermore, nutritional benefits such as high protein and low cholesterol content have been linked with some non-conventional species such as domestic cavy (Lammers et al., 2009; Yiva et al., 2014), grasscutters (Aluko & Salako, 2015; Ibitoye et al., 2019; Owen & Dike, 2012; Yeboah, 2009) and guinea fowl (Moreki & Seabo, 2012a) including guinea fowl eggs which Isaac & Chiedu (2016) and Yildirim (2014) recommend for infants and children for proper growth and good bone development. There is evidence that in the light of climate change livestock diversification with the use of NCL is important in ensuring household food security (Megersa et al., 2014).

In Cameroon, the demand for cavy meat is increasing and its production is reported to be a versatile economic activity for small-scale farm households (Nuwanyakpa & Lukefahr, 1997). Their low-cost production requirements of less space, capital and locally sourced feeds amongst others make them rural households' favourites (NRC, 1991). A study conducted by Fon et al. (2014) shows that a majority of cavy farmers in Cameroon were females. Thus, public investment in the cavy sector may provide a promising empowerment pathway for women who use income from the business for household needs. This income for female household members is guaranteed due to the species' high prolificacy which, in turn, can give all household members access to animal sourced protein (Dominguez-Salas et al., 2019). Due to these benefits and increasing production interests, Niba et al. (2012) report that since 2001, the Ministry of Livestock, Fisheries and Animal Industries in Cameroon targeted 'mini-livestock' (see below for terminology) species to double national production by 2015.

However, the non-conventional livestock in Cameroon are still faced with barriers such as exclusion from policies and development strategies (Ayagirwe & Meutchieye, 2018). This might be due to the unclear zoonosis implications. While a study by Meutchieye et al. (2017) suggests that cavy is a potential source of some human diseases, there is little empirical evidence on possible risks of zoonotic disease that the production and consumption of non-conventional livestock could bring (Akinola et al., 2015; Gono, et al., 2013b; Owen & Dike, 2012). This is due to minimal research and extension (Gono et al., 2013a; Moreki & Seabo, 2012b; Yeboah, 2009). In addition, this production system is faced with issues of inadequate markets (Avornyo et al., 2016; Gono et al., 2013a). The FAO (2014) also expresses concerns

about animal welfare and ethics from the poor understanding of non-conventional livestock husbandry practices.

To mitigate these barriers and bring to the fore the food security potential of domestic production of the various non-conventional livestock species which are important to the diet of most Cameroonian households, it is important to recontextualise existing understandings and policy agendas. From here, our activities departed.

Our core research team was composed of Kenyan, Malawian, Nigerian, and German members. We first searched for collaboration partners in Cameroon to include local experts into the project. We decided for a participatory approach for methodological and research ethical reasons as we wanted to give a voice not only to members of the academic sector, but to listen to as many different perspectives represented in the NCL sector as possible.

To this end and to learn more about the current situation of non-conventional livestock species in Cameroon, a multi-stakeholder symposium was held at the University of Dschang with the aim to:

- connect multi-stakeholders and leading experts on non-conventional livestock species,
- create a forum for stakeholders to exchange knowledge and discuss research gaps, and
- develop framework ideas for animal welfare, ethics, and trade-offs for sustainable production of non-conventional livestock species.

The following is structured as follows: First, the study area, the setting, and the workshop structure are presented in the material and methods section. The results section follows and is composed of three parts that include (i.) the expert inputs, discussion, and dissemination of knowledge, (ii.) the results of the symposium's World Café session, and (iii.) the framework ideas for sustainable production of non-conventional livestock species. Finally, results are discussed, and conclusions are made.

Material and methods

This section presents a background to the study area and describes the methods adopted for the symposium.

Study area

The study was carried out in Cameroon. The country is located between Latitude 2° N to 13° N; Longitude 8° 25' E and 16° 20' W with a population of approx. 24.4 million multicultural inhabitants in Central Africa (INS, 2019; MINEPDED, 2012). The geo-climatic characteristics of the country are composed of five agroecological zones with a rich biodiversity enabling the development of a variety of socioeconomic activities. About 80% of the population is actively engaged in biodiversity related activities, such as fishing, agriculture, livestock farming, or gathering activities, most of which impact positively on the family revenue or on a greater extent, to the national economy and on foreign trade (MINADER, 2015). These activities are co-regulated by around 26 institutions of primary importance by defining (the Presidency) and implementing the government policy (the ministries) or by laws enacted by the parliament

and the Senate, or by legislation on international conventions, protocols and treaties ratified by the country. The venue of the symposium itself was the University of Dschang, located in Dschang subdivision, Menoua Division in the Western Region of Cameroon (Figure 1). It was held in March, towards the end of the dry season.

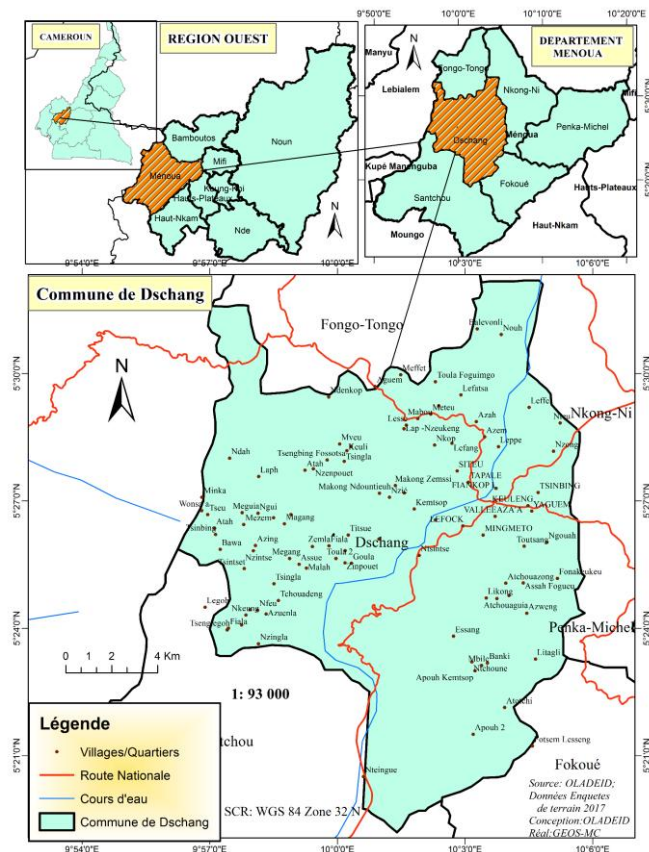


Figure 1: Location of the city of Dschang. Source: Commune de Dschang, 2019

Setting

Data was collected through the application of the participatory action World Café methodology to create a collaborative and interactive environment (Brown & Isaacs, 2005). This method has been found useful in its application in scholar-governance-practitioner-farmer dialogue as well as in diverse fields (Löhr et al., 2020; Taylor Buck et al., 2020; Civera et al., 2019; Silva & Guenther, 2018; van Wyngaarden et al., 2018; Kanie et al., 2012). The interdisciplinary and transdisciplinary selection of participants was with the aim of tapping from the various tacit knowledge while discussing in small groups and still be connected to the big picture theme (Brown, 2010). It is also a way to give a voice to more introvert participants who do not like to talk in front of a big audience and to involve participants in deeper discussions. This way, it is possible to learn as much as possible from a range of participants who are usually not included in academic knowledge creation, but who are experts in their fields and possess valuable knowledge and experiences. At the same time, it is also an opportunity for participants to connect and network which, from a research ethical perspective, was very important to us. Knowledge creation is not a one-way street, and we

also emphasized the fact that participants needed to benefit from the symposium, too, as it took their time and energy to engage with us.

Colleagues from the Universities of Dschang (Cameroon), Hohenheim and Tübingen (Germany) organised the symposium which took place on the 23rd of March 2023 from 9 am to 4 pm at the University of Dschang main campus, Cameroon. Following the seven principles of World Café (Fouché & Light, 2011; Schieffer et al., 2004), this considered the first principle **set the context**^{p1} as the symposium had a defined theme of “*Redefining frameworks for animal welfare, ethics, and trade-offs in non-conventional livestock species production*”. In a very **hospitable space**^{p2}, 35 participants comprising researchers from Dschang, Buea, Hohenheim, and Tübingen, policy makers, members of NGOs, farmers, rural entrepreneurs, and students were in attendance.

Workshop structure

The symposium started with five keynote speeches to **explore questions that matter**^{p3} followed with discussions to help form the questions for the World Café session. The overview of a World Café session was provided to ensure a common understanding of the process and to **encourage everyone's contribution**^{p4}. Participants were given random numbers between one and four and groups were formed based on matching numbers to **cross-pollinate and connect diverse perspectives**^{p5}.

The four topics settled for after the general discussion were:

- Knowledge dissemination
- Animal ethics – limitations, barriers, adaptation to local context
- Policy and institutional opportunities and barriers
- Research gaps

Facilitators were encouraged to follow the 6th principle of **listen together for patterns, insights, and deeper questions**^{p6}. Each group spent 15 minutes on each topic, using post-it notes, coloured pens, and flipchart papers to capture their thoughts. Each group after going round, had facilitators provide summary and introduction of each topic. At the end, each stand facilitator presented feedback on key points of their group. Participants were asked to vote their most agreed points per topic. They got four sticky points that they put to the key presented points which they identified as the most pressing or interesting. Participants could vote for one key point of each of the four topics above. Key points with the most stick-ons were harvested following the 7th and last principle of **harvest and share collective discoveries**. This was used in ranking the most important or pressing issues to consider from the perspective of the participants from most pressing to solve to least pressing to solve.

Results

The results are presented under three themes. Insights on the contribution of the non-conventional livestock species to biodiversity and sustainable conflict-resilient food systems were subsequently discussed.

Theme 1: Expert inputs, discussions, sharing and dissemination of knowledge

The five keynote speeches were:

- a) Historical overview based on evolution of naming and overview of biological classification and diversity of the animals in Cameroon (biological terminology).
- b) Teaching curricula of non-conventional livestock in Cameroonian higher institutions.
- c) Research key findings and prospects of non-conventional livestock in Cameroon.
- d) Animal health, welfare, and ethics.
- e) Governmental perspectives.

The first speaker provided an historical overview around the nomenclature and biological classifications of emerging livestock in Cameroon as well as changing terminologies for these species whereby an accepted terminology has been elusive over time which may inadvertently redirect attention away from the importance of these species. The 'mini-livestock' concept was further reiterated as small-sized animals which are part of the daily lives of peasants (cavies) or were directly harvested from nature (native snails, e.g., African Giant snail; grasscutter). Over time, the name changed to 'non-conventional livestock' (NCL) as other species of larger sizes (ostrich) were included. Although the term NCL appeared too restrictive including a negative connotation, its contribution to human food and impact on biodiversity gained new momentum. NCL are from variety of classes and species ranging from rodents to poultry, from invertebrates to batrachians, and from insects to reptiles (Table 1). Of all the rodents, domestic cavies are the best known and extended species in many regions of Cameroon, with production systems from kitchen to research stations; from experimentation-production to consumption. The African Giant snail is widely exploited from the wild for meat in variety of dishes. While these categories of livestock have opportunities, they also have their challenges.

Table 1: What are the concerned emerging-NCL animal species in Cameroon?

Livestock group	Species
Rodents	Grasscutter, Domestic cavy, African Giant Rat, Rabbit.
Poultry	Quail, Ostrich, Guinea fowl, Muscovy duck, Dutch duck (green neck) Goose, Asian class chicken (Cochin, Brahma, Lanshan) and native chicken strains, Turkey
Invertebrates	land snails, e.g. African Giant snail
Batrachians	African Giant Frog, Green and Bull-frog
Ungulates	Donkey
Insects	Black soldier fly, house fly, Palm weevil, African bee, termite

The second keynote speech was on the teaching curricula in Cameroonian higher institutions to include NCL. This was to show the current status and underlying issue of neglect of NCL by education and research. This presentation highlighted the need for NCL in the teaching curricula as animal production in the West High lands of Cameroon is facing increasing challenges in its contribution to the human food chain nationally and internationally. Several constraints were mentioned, among which were increased urbanization due to high population density; reduction around land available for pasture animal production; increasing pressure on the available natural resources (feed, land and labour); climate change with consequent effects on livestock (flooding, erosion, dryness, etc); socio-political conflict. Therefore, if the NCL industry is to burgeon, blossom and produce bountifully, efforts and novel strategies are needed in education and research to identify candidate animals that can provide households with their food security needs. This will facilitate the acquisition of knowledge with positive implications for skills development, sustainability and productivity of NCLs.

Following up was to hear from the research agencies, on key findings and prospects in NCL in Cameroon. The objective of NCL research is principally to address protein malnutrition and curb poaching (wild hunting) to reduce the extinction of endangered species. The current research focus is to find locally sourced feeds and nutrition for NCL. For example, results from a range of research studies was presented, including on the effect of incorporating of pigeon pea (*Cajanus cajan*) on growth performance of cavia (*Cavia porcellus* L) which showed that pigeon pea can efficiently be used and can contribute to the improvement of production performance of cavia; comparative performance of grasscutters (*Thryonomys swinderianus*) fed maize and rodent pellets as concentrate supplement under intensive management system which proved effective and can serve as complete diet for sustainable grasscutter production; growth performance of *Archachatina marginata* snails fed different vegetable diets with concentrate feed under intensive management system.

Moreover, research also provides farmers with training through workshops and field demonstrations. It focuses on production systems and climate change effects. For instance, research on the perception of climate and environmental change on the performance and availability of the edible land snails and the growing need for conservation. The perspective of research in NCL will be strengthened if better infrastructure and capacity development are enabled, accompanied by more research on breeding, nutrition, health, management practices.

The fourth keynote focused on animal health, welfare and ethics to provide an understanding of what these mean in practice. Sentient animals are widely regarded as morally considerable beings that deserve equal treatment (e.g., Peter Singer¹: all sentient beings; e.g., Tom Regan²: all subjects-of-a-life). Consideration of interests (Singer) or respecting individual rights (Regan) implies developing specific ethical criteria and rules for correct treatment also of husbandry animals. In the African agricultural systems, considerable ethically relevant welfare factors were highlighted for the different systems. For example, in the extensive systems issues included comparably extreme temperatures (for many mammals), often poor-quality pasture,

¹ E.g., Singer, Peter (1975): Animal liberation: A new ethics for our treatment of animals.

² E.g., Regan, Tom (1983): The Case for Animal Rights.

parasites, and often highly restricted access to water. Whereas, in the semi-intensive or extensive systems, the following applies: space allowances, types of flooring, air quality and abnormal behaviour. In the Cameroonian context, the farmers' representative gave reasons for the poor welfare practices by farmers, listed among others as: lack of knowledge and lack of funding to afford better production practices. There are major ethical concerns with existing livestock and slaughtering methods. Therefore, a framework that would facilitate communication between farmers, facilitators and researchers would be helpful in that regard.

The fifth speaker took a policy-governmental perspectives and explained the role of the Cameroonian government in the development of NCL. Several projects have been implemented to support the production of such species, e.g. the Heifer project international-Cameroon rabbit project (HPI-CAM) increased the number of rabbit projects managed by women to elevate gender awareness and social status. Departments have also been created for the service of NCL. It is therefore important to revisit the existing strategies within a framework that is more appropriately suited to capture animal welfare issues in NCL in the country.

Theme 2: What is necessary for sustainable breeding of non-conventional livestock species?

The World Café session produced the following results under four sub-sessions. The topics of the sub-sessions were highlighted during the presentations and provided an entry point for discussions that allowed all participants to gain more insight in the situation on the ground in Cameroon.

Knowledge dissemination

The World Café participants discussed and shared their ideas on knowledge dissemination between researchers and livestock farmers and ranked five different issues as almost equally important in terms of disseminating research knowledge (Figure 2).

First, Cameroon is a country characterized by a high level of linguistic diversity. However, knowledge is often not made available in local languages, and people who might have the means to access it, may still struggle to understand the information provided.

Second, the importance of social media was discussed. Knowledge needs to be disseminated using as many different ways and channels as possible to best ensure that target audiences and recipients can best access it. The use of social media is one way to provide knowledge in an understandable and concise way that is easily accessible to many people³.

Third, two related points were mentioned, namely the regular holding of training programs and sharing of experiences. This face-to-face dissemination of knowledge complements the dissemination of knowledge through social media and provides an additional opportunity to discuss experiences and learn together and from each other. Participants mentioned that not only the knowledge of researchers is important and needs to be transferred, but also the local and experienced knowledge of livestock farmers needs to be shared and disseminated among

³ The authors want to highlight the problem of fake news as well as data privacy issues regarding social media that have not been discussed during the World Café.

them. This will ensure that traditional and research knowledge can benefit from each other and the two worlds merge.

Fourth, the importance of creating a platform for ongoing exchange between stakeholders was discussed. This issue is intertwined with the previous one. Training programs and sharing of experiences are important parts of the knowledge dissemination process, but only if people are able to constantly exchange and learn from each other, a permanent dissemination of knowledge is ensured.

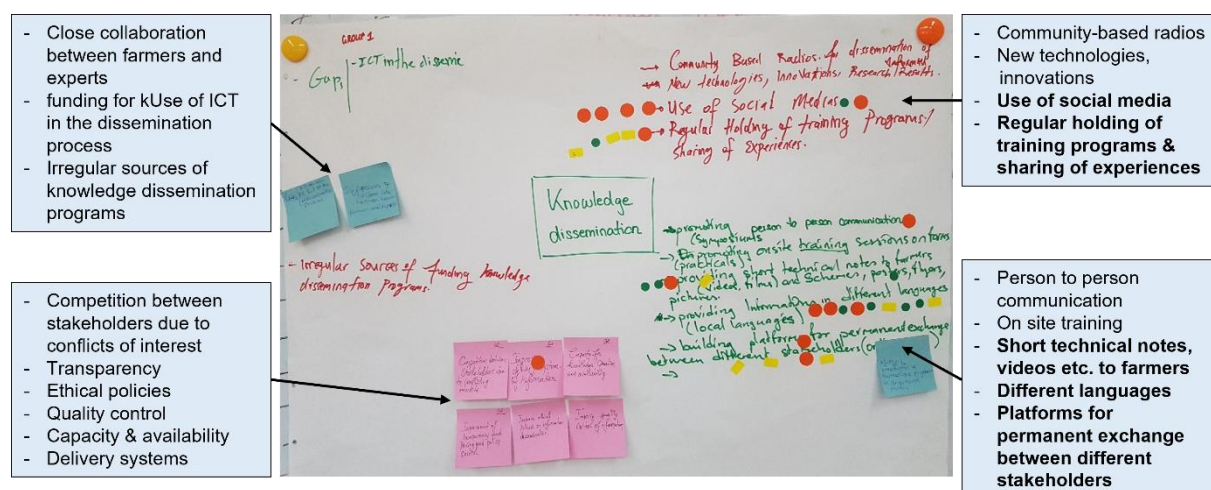


Figure 2: Results of the World Café: Knowledge dissemination. (Kerstin Schopp, Maria Oguche)

Finally, participants mentioned that knowledge should be disseminated using different techniques, such as videos, films, posters, pictures, or flyers. This issue also complements the dissemination of knowledge through social media, as it provides additional means to access knowledge. Not all farmers may have a stable internet connection all the time, a mobile phone may stop working, or the farmer may need to buy new credit for the mobile phone. There are many situations where it is convenient and helpful to have printed version of information.

Animal ethics – limitations, barriers, adaptation to local context

Animal ethics was discussed in terms of barriers and limitations as well as adaptations to local contexts as shown in Figure 3. Two issues stood out and were repeatedly discussed among the participants. The first was local culture, the second was hunger and poverty. Local culture includes issues like taboos, dietary habits, and daily usage of livestock species. Dietary habits are important to consider as people may (not) consume a particular species for cultural reasons. Daily usage of livestock includes people's valuation of the species used and the related animal welfare issues.

Hunger and poverty were seen as barriers for animal ethics. Participants argued that if even people cannot live a good life, how can they ensure that their animals can? When people suffer from poverty, they do not have the means to ensure that animals have enough space, a good shelter, quality food, or veterinary care. When people suffer from hunger and lack food security, they cannot address the question of whether it is morally right or wrong to consume animal products at all or based on problematic husbandry conditions.

Cultural aspects of local communities, especially taboos, also strongly influence questions of animal ethics. Some animal species may not be kept as livestock or be consumed, while others

may need to be used for cultural practices. Overall, however, there is a lack of formal literature on local indigenous practices of animal ethics.

Other obstacles for farmers to put animal ethics into practice are a lack of knowledge about animal ethics, a lack of appropriate equipment, and a lack of information channels (see also knowledge dissemination). Sometimes economic interests also take precedence over social interests, including issues of animal ethics and animal welfare.

The discussion further highlighted the need for a better understanding of animal welfare and ethics. It also showed that there is need to develop guidelines for animal welfare and ethics with sellers and buyers. This includes raising consumer awareness of animal ethics and training for livestock farmers and buyers in animal welfare and ethics in local languages.

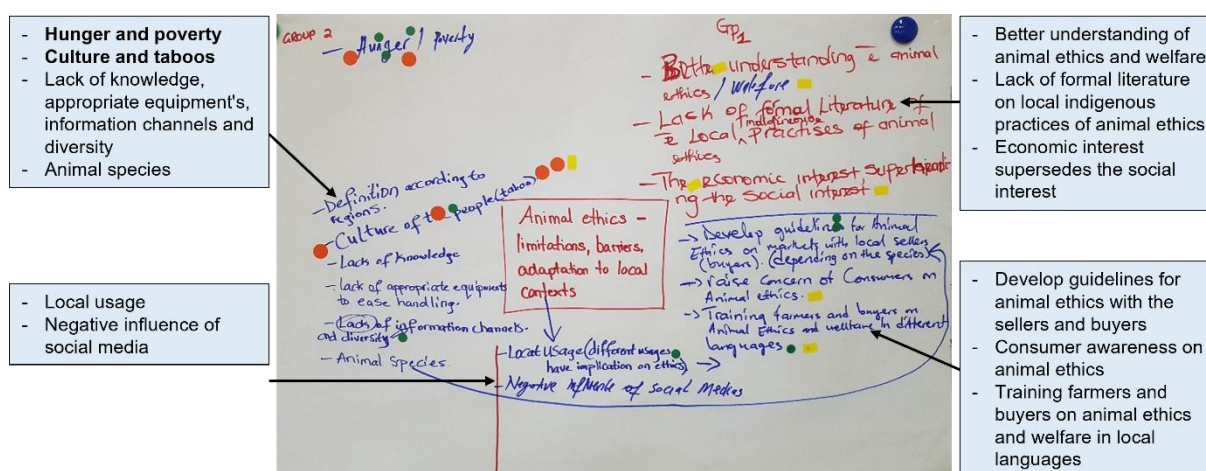


Figure 3: Results of the World Café: Animal ethics - limitations, barriers, adaptation to local contexts. (Kerstin Schopp, Maria Oguiche)

Policy and institutional opportunities and barriers

Participants also discussed policy and institutional options and barriers to livestock farming of non-conventional species where they only focused on the barriers (Figure 4).

The transfer of research results into policy was identified as the most important opportunity to enable and promote NCL farming. Participants also expressed the importance to provide livestock farmers with available or affordable inputs and equipment, as well as with access to social media communication tools. Unified technologies, funding, and visibility do not only help to create more willingness and an enabling environment, but also to improve the livelihoods of livestock farmers and consumers. Finally, it would be an opportunity to create open spaces for all value chain actors of NCL species that enable them to contribute to policy making.

Participants identified enforcement and implementation as well as conflicts between farmers and livestock keepers as the most important barriers. Political stability, the involvement of all people in policy making, and subsidies for farmers, as well as addressing land tenure issues could help with implementation and enforcement. If framework conditions enabled and empowered more people, they could shift to other production systems.

Additional barriers were identified and discussed. For livestock keepers, these include difficulties in accessing veterinarians, high feed costs, and difficulties in acquiring animals of

high genetic merit. More general societal barriers are socio-cultural beliefs that may discourage potential consumers from buying non-conventional livestock products and a poor communication of the benefits of non-conventional livestock products. In addition, there is a need for their promotion.

Despite these multiple challenges, the participants also identified opportunities to support livestock farmers.



Figure 4: Results of the World Café: Policy and institutional opportunities and barriers. (Kerstin Schopp, Maria Oguiche)

Research gaps

Research gaps were discussed in terms of actual knowledge gaps and potential research needs, but also in terms of research challenges, such as funding or communication (Figure 5).

Participants ranked the gap between researchers and livestock farmers as the most important research gap to be addressed. This issue was identified as consisting of two problems. The first is the lack of communication and collaboration between researchers and livestock farmers. The second is the lack of proper communication techniques, which makes it difficult for researchers to disseminate their findings, but also to collect the knowledge of livestock farmers.

Lack of knowledge was identified in terms of sustainable strategies to help livestock farmers improve productivity, a contextual definition of animal welfare and animal ethics, the management of the value chain, and comparative livelihood analysis. The lack of knowledge on zoonotic diseases and the unclear definition of the classification of conventional and non-conventional species were also discussed. Participants also mentioned the need for research on and the development of effective policy-making processes.

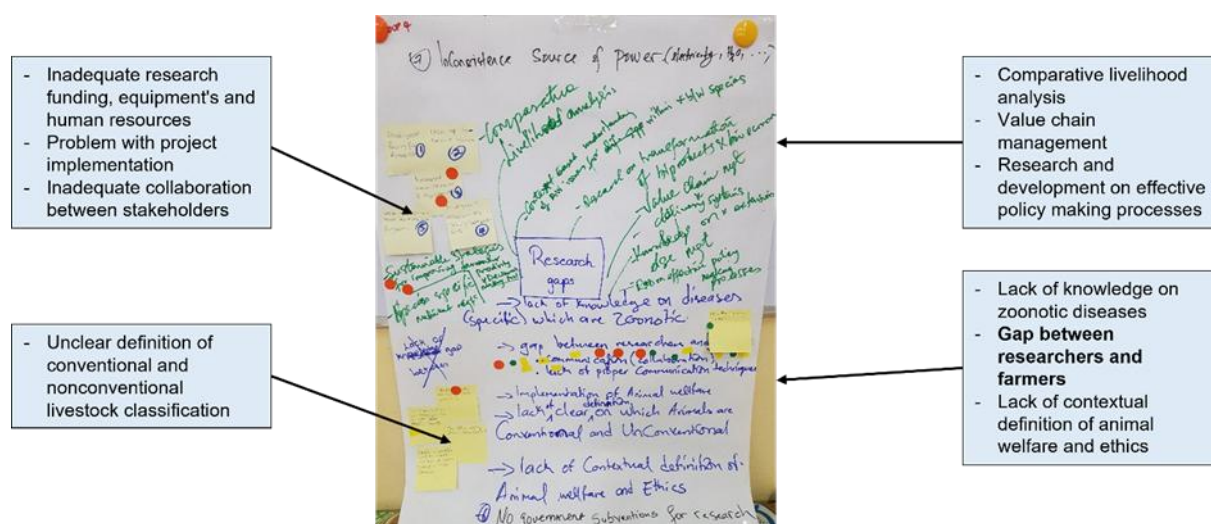


Figure 5: Results of the World Café: Research gaps. (Kerstin Schopp, Maria Oguche)

Challenges in the area of research include inadequate research funding, equipment, and human resources, as well as the insufficient collaboration between the stakeholders involved in the value chain of non-conventional species. Additionally, there are sometimes problems with project implementation.

Theme 3: Framework ideas for sustainable production of non-conventional livestock species

Based on the results and insights gained from the World Café session and using an animal ethics approach, we developed criteria for a framework that addresses Sustainable Development issues for all actors involved in the value chain of non-conventional livestock species.

It is important to create an enabling framework that at all nodes of the value chain (i.) minimizes the trade-offs and risks of disease transmission, (ii.) promotes better animal welfare practices for improved product quality, and (iii.) responds to the needs of non-conventional livestock species. This framework should support ethical principles without undermining Sustainable Development. It should provide animal welfare and respect animal ethics concerns as part of a larger approach not opposing but connecting to and supporting human welfare and the environmental integrity.

Such a framework is based on an effective and well-working policy and institutional environment, as well as on the regular and effective dissemination of knowledge from researchers and livestock farmers. It is also crucial to address the identified research gaps to provide a good basis for further knowledge generation, communication, and mutual learning. Questions of animal ethics can then be better addressed, as there will be an understanding and sensitivity for them. Animal ethics also needs to be adapted to local contexts and cultures. It is necessary to create the understanding that people can only prosper, if their animals do not suffer.

Discussion and Conclusion

The results from the Symposium emphasise the importance of NCL for meeting food security needs within a constrained context of knowledge and various infrastructure gaps. We discuss

the possible explanations for these limitations and present a conclusion for consideration going forward.

As Cameroon's present is shaped by its colonial past, it is important to consider that, although the country is now independent, there is still the challenge of path dependency, and in some cases, decolonizing the mind (Ngugi wa Thiongo 1998). This challenge particularly affects the agricultural sector. Current livestock infrastructure and the dominance of conventional livestock reflect previous policies designed primarily to provide solutions to challenges and promote opportunities that may no longer reflect the same contexts as the situation currently in Cameroon. This line of thought stipulates that historical policy decisions strongly influence later ones, whilst limiting current policy options that may lead to systematic change (Erdman et al, 2011; Subrahmanyam, 2006; Flynn & Giráldez, 2004). Arguably, policy-related path dependence makes it particularly difficult to accommodate and account for changes (e.g. food security, climate change, animal welfare and ethics), resulting in systems that are less adaptable to understanding and addressing the challenges raised in the Symposium. As in other African countries, agricultural policies were designed to maintain the dominance of Western communities (cf. already Jahnke, 1982) in facilities, research, and training. Still in the early 2000s, the livestock sector reflected the Cameroonian context, whereas some policies continue from the colonial past (Bamou and Masters., 2007; van't Hooft and ETC/Compas (eds), 2006) and where policies are not driven by public engagement. A shift towards NCL is promoted by NGOs and would be a new political turn in Cameroon's agricultural sector that could contribute to the development of a sustainable national agricultural strategy and address the country's food security and malnutrition problems.

While it is apparent that NCLs provide a multitude of benefits that could contribute to meeting the SDGs, concerns including their inherent ethical principles and the implications for (conventional) livestock production are growing. Of these is the explicit omission of animal welfare from the SDGs which may have implications for the policies that governments of nations in the Global South, such as Cameroon, are pursuing (Sebo et al, 2022). Moreover, little attention is paid to livestock's welfare issues and its contribution to Sustainable Development regarding economic, social, cultural, and environmental dimensions (Keeling et al, 2019; Independent Group of Scientists appointed by the Secretary General, 2019; Keeling et al, 2022). As such, appeals for improved farm animal welfare are emerging⁴ however, tend to be divided along a spectrum from anthropocentric to ecocentric conceptualizations of sustainability and animal welfare. On one hand, the anthropocentric view acknowledges that pursuing the majority of the SDGs is compatible with animal welfare improvements (Antillón et al, 2020; Marchant-Forde and Boyle, 2020; Keeling et al, 2019). On the other hand, ecocentric perspectives promote more equity-based understandings and caution against 'exploitation- based sustainability' (Earnshaw, 1999). Accordingly, animal welfare merits broader attention beyond (significant) concerns related to climate change, biodiversity and feeding the global population (Bracke, 2023; Broom, 2019). Ecocentric thought further

⁴ The debate on husbandry welfare and ethics has focused intensive livestock production systems of developed countries (cf. Thompson 2021). The welfare of animals kept in low- and middle-income countries under both intensive and extensive systems has tended to attract much less attention, but is slowly gaining momentum (Doyle et al, 2021; Hernandez et al, 2022; Gallo et al, 2022; Temple and Manteca, 2020).

provides a concrete justification for repositioning animals at the center of the sustainability agenda and an explicit inclusion into the SDGs to mark their direct rather than indirect value for human beings (Bergmann, 2019). Propositions for an 18th SDG that draws attention to the individual animal as a legitimate participant in Sustainable Development on 'equal footing' with the other 17 goals have also been raised (Murawat, 2022; Visseren-Hamakers, 2020).

The relationships between humans, animals and the environment are a common thread weaving through animal welfare and sustainability discussions, which were raised at the Symposium. This emphasises that an approach, such as One Health, that highlights the interconnectedness of human, animal and environmental health, would not only take zoonotic diseases into account but provide an entry point for reflections on animal and environmental ethics to provide the full spectrum. Such a move would need to involve researchers, livestock farmers, and stakeholders along and outside the value chain (Hatab et al., 2019). This is to ensure that it contributes to intra- and intergenerational justice in the sense of Sustainable Development that is to contribute to a better life for those living today as well as for future generations (WCED, 1987). Additionally, this would contribute to the achievement SDGs, such as SDG 2 "Zero hunger", SDG 3 "Good health and wellbeing", and SDG 5 "Gender equality". For such a process, it is important to adopt a participatory approach and to involve different actors, forms of knowledge, age groups, and genders so that they can be heard and contribute to the future agricultural policies: First, there are democratic and participatory reasons. People who are affected by certain policies and measures should be able to decide for or against them, and to shape these policies. Second, involving people in policymaking and research processes gives legitimacy to these processes. Third, people have local knowledge and practices that are often neglected in research and policy processes. (Schönhuth & Jerrentrup, 2019). If people are not heard, unequal power structures are reinforced, and issues of neo-colonialism need to be raised. This contributes to Sustainable Development based on intra- and intergenerational justice

For this reason, we used the participatory World Café approach to gather the knowledge, experiences, and understanding of different actors, and to connect them and to enable them to share their knowledge in the future. Although our symposium is only a very small contribution to support such a process, we have demonstrated its feasibility and the willingness of different participants to engage in and contribute to such a development. We emphasize the following three points:

- (i.) There is a need to understand local cultures (value systems, languages, practices, etc.) to connect with, support and establish compatible and workable principles of animal welfare and ethics. This includes developing guidelines with farmers, sellers, and buyers, at the same time raising consumer awareness as well as creating regular training opportunities for farmers and buyers in local languages. This would support all actors involved in the value chain at the local or micro level (cf. also Dominguez-Salas et al., 2019).
- (ii.) There is a need to implement, enforce, and revise existing policies and institutions governing the management of non-conventional livestock species at the national or macro level. This involves the above-mentioned turn to a distinct decolonial policy agenda that recontextualises SDGs to meet the needs of the world's poorest.

MINEPIA's new Sub Directorate to supervise the development of emerging livestock species is an example for such a new turn.

- (iii.) The role of academia needs to be promoted to fill research gaps and to strengthen collaboration with extension and other agencies to adequately disseminate knowledge. In this way, the gap between researchers and farmers at the intermediary level could be minimized not least to contribute to successful processes mentioned under (i.) and (ii.).

There are other implications that need to be considered: As long as the demand for NCL livestock is essentially met by direct harvesting from the wild, prices to consumers will rise beyond the reach of resource-limited (local) communities and wildlife populations will decline. As a result, the food security of these communities will continue to be threatened, as will biodiversity, unless NCL animals are sustainably bred and farmed. However, profitable farming requires institutional support based on sound scientific knowledge to rationalize production and to enable rural development.

Successful management of NCL along the entire value chain should be based on the One Health Approach and at the same time relate to an expanded Ubuntu worldview. Both connect humans, animals, and the environment in a web of relationships and directly link animal ethics to human and environmental wellbeing. When animals suffer, neither humans nor the environment can thrive (Overgaauw et al., 2020; Etieyibo, 2017). Therefore, questions of animal and environmental ethics are intertwined with questions of the good life of humans, especially for those who may be left behind by the global market economy.

The issues identified at the symposium and discussed with the participants are critical to be considered in the management of NCL. If knowledge dissemination, ethics, political and institutional barriers, and research gaps are adequately addressed, NCL could not only contribute to improving food security but also to reducing malnutrition in Cameroon. The development of its own decolonial sustainable agricultural policy strategy could also contribute to the achievement of some of the SDGs, and eventually to Sustainable Development and a good life future for current and future generations. Our proposed framework for the development of sustainable production of non-conventional livestock species can be an entry point.

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Compliance with Ethical standards

As this paper is not based on research or fieldwork activities, according to German and Cameroon law as well as the guidelines of our universities (Hohenheim, Tübingen and Dschang), we did not need to obtain ethical approval for our activities. The Symposium was held in cooperation with the University of Dschang whose members were informed about the activities and actively contributing to the program. Written informed consent for photo, videos or information sharing was obtained from each participant of the symposium.

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