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DEVELOPMENT OF LIVE ANIMAL AND CARCASS CLASSIFICATION AND GRADING SYSTEMS FOR BEEF CATTLE, GOATS AND SHEEP IN THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY (SADC)

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DEVELOPMENT OF LIVE ANIMAL AND CARCASS CLASSIFICATION AND GRADING SYSTEMS FOR BEEF CATTLE, GOATS AND SHEEP IN THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY (SADC).

A study prepared for

African Union Interafrican Bureau for Animal Resources

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

AfCTFA	African Continental Free Trade Area
AU-IBAR	African Union - Interafrican Bureau for Animal Resources
CCARDESA	Centre for Coordination of Agricultural Research and Development for the Southern Africa
COMESA	Common Market for Eastern and Southern Africa
GDP	Gross Domestic Product
LTC	Livestock Technical Committee
PPP	Public-Private Partnership
R&D	Research and Development
SADC	Southern African Development Community
VIA	Visual Image Analysis

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EXECUTIVE SUMMARY

Classification and grading of live animals and carcasses are a critical activity in livestock production and formal marketing systems. However, livestock markets within the SADC region are largely informal, with formal markets used by few stakeholders in the value chains, such as large-scale commercial farmers, livestock traders and middlemen. Most producers and other stakeholders do not have much say on how the grading standards are applied in their countries and therefore, do not draw many benefits from them. The few formal classification and grading systems that have been developed are mainly intended for national markets. The countries in the region therefore fail to benefit adequately from regional trade in livestock and livestock products. The need to develop harmonised systems for classifying and grading live animals and carcasses is therefore apparent and has been recognised for some time in the SADC region. This was confirmed by all stakeholders consulted during this study. A regional live animal and carcass classification and grading system will provide opportunity for Member States to harmonise their standards and facilitate cross-border trade. It will also improve both local and regional communication between producers, traders and processors, and enhance the quality of live animals or animal products traded. This is expected to stimulate improved herd or flock management and facilitate the development of price setting mechanisms.

From the review of literature and the responses to questionnaires administered to the SADC Member States, this study observed that Member States use different livestock classification and grading systems and methods to facilitate marketing of live animals and carcasses. The study observed that few countries in the region have functional carcass grading systems to facilitate marketing of beef cattle, even fewer national grading systems are available to facilitate the marketing of goats and sheep carcasses, while virtually no formal grading systems exist for marketing live goats and sheep. Many of these national grading systems have deteriorated over time and have not been revised for several years to incorporate new classification or grading technologies and practices. They also discriminate against indigenous breeds because of their small size compared with exotic breeds. The preference for large exotic breeds and the commonly held view that indigenous breeds are less efficient particularly in feedlot finishing systems have become outdated: it has long been established that breeds within species show similar efficiency when reared to produce carcasses of the same composition or fatness. That efficiency and body composition will be attained at different weights and feeding periods determined by mature sizes of the breeds.

The discrimination against small breeds is particularly serious in grading systems in which weight is included, either directly or indirectly, in determining live animal or carcass grade price. The grading systems in current use therefore discourage commercial production of indigenous livestock breeds, yet they are overall more productive than exotic breeds because of their superior adaptability to the production environment. They also produce meat that competes favourably in quality with meat from exotic breeds. Removal of the discrimination against the small breeds can therefore be expected to result in more realistic market prices of indigenous breeds, which should encourage their commercial production. Given the numerical strength of indigenous cattle, goats and sheep in the region, their promotion and commercial utilisation can have a huge impact on the livestock sector. This calls for a major revision of the live animal and carcass grading systems and a paradigm shift in the way in which the region manages and utilises its livestock breed resources.

Thus, there is a need to develop harmonised live animal and carcass classification systems that benefit all Member States, are realistic and take into account the current situation in the region, as well as the technologies, skills and resources that are available and accessible to Member States. The proposal for harmonisation builds on the existing live animal and carcass classification systems, identifies current commonalities between national classification and grading systems and the similarities as templates for harmonisation. It also takes into account the experiences and lessons learnt from other countries and regions.

Based on the findings, the study makes the following recommendations:

- The carcass classification system in current use in Lesotho, Namibia and South Africa be adopted with modifications indicated in this report, and to include live animal classification.
- This study recommends against live animal or carcass grading at regional level because classification alone should be adequate to provide the necessary information for decisions on production, marketing, trade and pricing. However, individual Member States should be free to decide whether or not to grade live animals or carcasses after classification.
- Strategies for developing a regional live animal and carcass classification policy, guidelines and regulations, and for the domestication and adoption of the harmonised classification systems, should be designed and implemented in accordance with the usual SADC procedures and protocols for developing regional programmes and institutions. It is proposed that a stand-alone budget be drawn up and the requisite funding secured to ensure a timely and uninterrupted execution of the process activities until at least the launch of the regional classification system.
- Once the classification system has come into force, or even before that stage is reached, member states should draw up and embark on their own processes for domesticating the system in their countries, including preparation of domestic guidelines and regulations that are aligned to the regional regulations. This will include conducting stakeholder awareness workshops and field demonstrations, adopt training materials developed at regional level to train classifiers and other value chain actors, conduct regional and national workshops to train classifiers and other stakeholders, then officially launch the classification system after a trial period of implementation of, say, six months.
- The proposed regional live animal and carcass classification system should be considered as a living system and an important starting point. There will be need for refinement of the system as new information and technologies become available. The classification system should be improved based on scientific evidence. The following aspects are considered important in the improvement process:
    - The classification system should try to reduce the use of subjective assessments of the carcass quality criteria by introducing new and more reliable technologies, such as Visual Image Analysis (VIA) when it becomes affordable.
    - There is need to evaluate both pre- and post-slaughter handling procedures especially in indigenous livestock that can influence meat quality beyond the current focus on age and fat content.
    - Indigenous breeds usually have leaner and smaller carcasses, therefore post-slaughter procedures and chilling processes may be different from those currently designed for larger exotic animals. This should be investigated and taken into account as necessary in future revisions to the carcass classification systems

- Ideally, carcass classification should include measurement of meat quality, such as tenderness and juiciness, but currently, no mechanisms are available for their measurement. Research will be necessary to develop techniques for measuring them readily as part of carcass classification. Knowledge of consumer preferences will also be an important consideration in this regard.

- Therefore, substantial research will be necessary, together with regular reviews of the classification system, allowing improvements and new technologies to be incorporated into the classification system. There will be a need to ensure that no breeds are discriminated against, and biases need to be removed along the value chains, so that no stakeholder group benefits unduly against another group.

1. INTRODUCTION

The agriculture sector is of major social and economic importance in the SADC region, contributing in the different Member States between 4 per cent and 27 per cent of GDP and approximately 13 per cent of overall export earnings. Over 70 per cent of the region's population depends on agriculture for food, income and employment, with the livestock subsector contributing up to 40 percent of agriculture GDP in some countries (SADC, 2020). Hence the performance of this subsector has a strong influence on food security, economic growth and social stability in the region. The region is home to 64 million cattle, 38 million goats and 39 million sheep, as well as other animal genetic resources, such as pigs (7 million) and poultry (380 million). Similar to other developing countries in Africa, the livestock sub-sector within the SADC Member States is characterised by a dichotomy, comprising on one hand livestock reared by a large number of smallholder farmers and pastoralists in support of food security and rural livelihoods, and on the other hand livestock reared in relatively intensive and semi-intensive commercial production systems (Hoffmann, 2010). About 75 per cent of the livestock population are indigenous largely kept under smallholder commercial and traditional farming systems. They therefore play a more dominant role than exotics to national and household food and nutritional security, a fact often overlooked in red meat production, breeding and marketing policies and practices.

Performance of the livestock subsector is limited by lack of organised marketing as most of the animals from the smallholder sectors are marketed informally with little or no classification or grading of live animals or carcases according to their quality. Thus, the predominant livestock populations are largely bypassed by the formal marketing system . This benefits the traders often at the expense of livestock producers by taking advantage of the smaller size and lighter weights of indigenous breeds.

Classification or grading of live animals or carcasses are essential elements in the production, marketing and trade in livestock and livestock products. Classification is simply describing carcasses or live animals according to various criteria that affect quality or yield and subdividing each criterion into classes. On the other hand, grading involves combining classification classes into marketing grades. The main purpose of classification or grading is to put live animals or carcasses into homogenous groups with similar characteristics for purposes of determining values and facilitating market transactions (Webb, 2015). This is done to inform players in the meat value chains as to the yield, quality and edible portion of a carcass. Thus, classification and grading of live animals or carcasses facilitate marketing, trade and price setting. They are also an incentive for livestock keepers to produce slaughter stock that meet market requirements.

The SADC regional workshop held in Seychelles in March 2020 recognised the importance of live animal and carcass classification and grading. It also recognised some of the challenges of the live animal and carcass classification and grading systems in the region that seem to underrate the performance and potential role of indigenous livestock, as well as the absence of formal classification or grading systems in some Member States. Development of unbiased classification and grading systems for live animals and carcasses in the SADC region is therefore seen as essential, focussing on indigenous livestock. This is expected to promote the production, marketing and trade in indigenous cattle, goats and sheep, or their carcasses, because of their numerical predominance. This should enhance regional trade in livestock and livestock products, thus

contributing to regional economic integration, a key objective of SADC. Development of harmonised live animal and carcass classification or grading systems can be expected to facilitate such regional integration and free trade, as well as promoting the rearing of the more productive and predominant indigenous animal genetic resources (Tawonezvi, 2016; Tawonezvi et al., 2021), especially given that some of the breeds are transboundary.

This report reviews and analyses the status of live animal and carcass classification and grading systems for beef cattle, goats and sheep within the SADC Member States, explores the opportunities and strategies for development of improved systems, and suggests the processes of developing a regional policy and regulations for live animal and carcass classification systems, and for domesticating and adopting the proposed systems.

2. OBJECTIVES OF THE STUDY

The main objective of the study was to develop grading and classification systems for both carcass and live animals of cattle, sheep and goats with particular emphasis on indigenous breeds in Southern Africa. The specific objectives as given in the Terms of Reference (Annex 1) were:

- To compile existing classification and grading systems for live and slaughter cattle, goats and sheep in Southern Africa,

- To critically analyse and synthesise the existing classification and grading systems for live and slaughter cattle, sheep and goats in Southern Africa, and

- To propose and develop classification and grading systems for live and slaughter cattle, goats and sheep in Southern Africa

The expected outputs included the following:

- State of knowledge on classification and grading of carcass and live animals (cattle, goats and sheep) available

- A critical representation of instruments for classification and grading systems for live and slaughter cattle, sheep and goats in the region, available

- Classification and grading systems for live and slaughter cattle, goats and sheep for the Southern African region, developed and available

3 METHODOLOGY

The study approach followed the consensus reached in the inception meeting with AU-IBAR project staff and the process of executing the assignment was guided by the SADC's consultative process of developing regional programmes, policy and legal instruments. This involved first introducing the study to SADC Member States and soliciting for their support and cooperation, including identifying national contact persons. In view of the COVID-19 pandemic, consultations with stakeholder and other key informants were done electronically. The study comprised the following:

- Review of national and regional documents
- Administer country questionnaires, approved by AU-IBAR, to all SADC Member States
- Hold a virtual workshop with stakeholders and value chain actors within each SADC Member State
- Online meetings and consultations the SADC Secretariat and CCARDESA Secretariat
- Prepare working documents and reports
- Conduct a validation workshop on the Interim technical report (InTR)

Review of literature

Documents and reports relevant to this study were provided by AU-IBAR, CCARDESA and SADC. These included the resolutions made by the SADC meeting held in Seychelles to conduct the study, and the resultant project Concept Note. Other relevant documents were sought through appropriate channels from SADC Secretariat, CCARDESA Secretariat, Member States, and from online searches. The regional documents reviewed included the following:

- The SADC Regional Agricultural Policy,
- The Management of Farm Animal Genetic Resources in the SADC Region, and
- The Regional Industrialization Strategy and Road Map.

Other relevant documents reviewed included literature on regional integration and free trade policies in SADC, the African Continental Free Trade Area (AfCFTA), the Manual on the Harmonized Grading and Classification of Cattle, Goats and Sheep for Meat in COMESA (2019), as well as literature on classification and grading systems and regulations in the individual SADC countries. Relevant information from other countries and regions of the world was also reviewed. All these documents were reviewed to understand, compare and contrast the live animal and carcass classification and grading systems in the individual SADC Member States and other countries, as well as the policies, strategies, laws and regulations that guide the implementation of these systems.

Preparation and administering of field questionnaires

In view of the limited published data on live animal and carcass classification and grading in the SADC region, questionnaires (see Annex 2) were prepared in collaboration with the team at AU-IBAR and were administered to relevant stakeholders in all Member States in the region. The questionnaires were designed to gather available information on the status of classification and grading of live animals and carcasses and glean on the implications on production, marketing and trade. The questionnaires were sent to the national livestock directors and coordinators for completion by relevant stakeholders and experts in their countries. These included breeders associations, meat and live animal graders, abattoir operators, livestock

researchers, farmers' unions, auctioneers, and individuals knowledgeable on the live animal and carcass classification and grading systems. Electronic follow-ups (by email, WhatsApp, sms) were undertaken as necessary to expedite submission of completed questionnaires. A total of 26 responses were received from 10 SADC Member States, namely, Botswana, Eswatini, Lesotho, Malawi, Namibia, Seychelles, South Africa, Tanzania, Zambia and Zimbabwe. A questionnaire was completed by one or more designated officers thus, making the information provided more of a national response than opinions of one individual.

Facilitate a validation meeting

The consultant facilitated the electronic validation meeting to present the draft regional report. Inputs from the validation meeting were consolidated and used to update the study report.

4 CURRENT STATUS OF NATIONAL SYSTEMS FOR CLASSIFICATION AND GRADING OF CARCASSES

The SADC region does not have unified systems of classifying or grading of carcasses. Individual Member States have their own carcass classification and grading systems. Table 4.1 shows the countries that have carcass or live animal classification or grading systems. A total of nine countries has beef carcass classification or grading systems, compared with seven countries having small ruminant (goat and sheep) carcass classification and grading systems. There are no grading systems for live goats or sheep. Secondly, not all the systems presented in Table 4.1 are functional. Thus, all the grading systems in Tanzania have not been implemented since their formulation in 2011, while the grading system for live beef cattle in Zambia was formulated recently and is awaiting launch.

Table 4.1: *List of countries with beef cattle, goat and sheep classification or grading systems*

Country	Carcass classification or grading system			Live animal classification or grading system			Comment
	Beef cattle	Goats	Sheep	Beef cattle	Goats	Sheep	
Botswana	√	√	√	√			Grading regulations available
Eswatini	√			√			Live animal grading regulations not readily available
Lesotho	√	√	√				Carcass classification regulations available
Malawi	√	√	√	√			Grading regulations available
Namibia	√	√	√				Regulations readily available
Seychelles							No classification or grading systems in place
South Africa	√	√	√				Carcass classification regulations available
Tanzania	√	√	√	√			Grading systems and regulations prepared in 2011 but still not in use
Zambia	√			√			Carcass grading regulations not readily available, Live cattle grading regulations recently formulated, still to be launched
Zimbabwe	√	√	√	√			Regulation for carcass classification and grading and for live beef cattle available
Total	**9**	**7**	**7**	**6**	**0**	**0**	

This section presents the carcass classification and grading systems in beef cattle and small ruminants in the SADC Member States, together with the impacts and opportunities on production and marketing.

4.1 Beef carcass classification and grading systems

Table 4.2 summarises the official carcass classification and grading systems. These were compiled using the responses to the questionnaires and from review of literature. All the beef carcass classification and grading systems use the same or similar carcass classification criteria, namely, age and sex of the animal, fat cover, and carcass conformation. However, the number of carcass classification classes and their definition or description within criteria vary substantially between countries:

- Age of animal at slaughter is in all countries determined by the number of permanent incisor teeth. In addition to this, the degree of bone ossification is used in some countries to further separate age among old animals with full permanent incisor teeth.
- Sex of animal: the number of sexes considered in the classification systems vary considerably between countries, from systems where only bulls showing male secondary sex characteristics are recorded, to systems where the sex of each animal slaughtered is recorded.
- Carcass fat content is determined mainly as the amount of subcutaneous fat cover assessed either visually or by measuring the thickness of the back fat. In Malawi and Tanzania, the degree of marbling of the eye muscle (m. longissimus dorsi) is also determined. Fat colour is a classification criterion in Malawi and Zambia, with carcasses having white or creamy fat preferred over those having yellow fat.
- Carcass conformation is assessed visually in all countries. In Zimbabwe, carcass conformation is officially measured as fleshing index, the ratio of carcass weight to carcass length. However, there has been a growing but still unofficial migration to visual assessment in recent years.
- Carcass weight: carcasses are weighed hot (i.e. soon after slaughter) in all countries, except in Malawi where carcasses are weighed cold, after a 24-hour chill and weight is included in determining carcass grade.

Table 4.2: Beef carcass classification and grading systems in SADC countries

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Fat cover	Conformation	Carcass damage					
Botswana	0-2 3-4 5-8		N = None P = Patchy U = Uniform E = Excessive	G = Good F = Fair P = Poor T = Very Poor		Prime 0-2 teeth Good con-formation Uniform fat cover	Super 3- 4 teeth Good con-formation Uniform fat cover	Grade I 5-8 teeth Good confor-mation Uniform fat cover	Grade 2 Over 72 months old Good conforma-tion Uniform fat cover	Grade 3 Any age Poor conformation Patchy or no fat cover

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Fat cover	Conformation	Carcass damage					
Eswatini	0 1-2 3-6 >6					Super 0 teeth	Prime 1-2 teeth	Good Average Quality 3-6 teeth	Fair Average Quality >6 teeth	Compound Worn out teeth
Lesotho	A = 0 AB = 1-2 B = 3-6 C = >6	Adult bull	0 = 0 mm 1 = 0.1-0.9 mm 2 = 1.0-3.0 mm 3 = 3.1-5.0 mm 4 = 5.1-7.0 mm 5 = 7.1-10.0 mm 6 = >10.0 mm	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					
Malawi	0 2-4 5-6 >6 Bone ossification	Bull Steer Heifer Cow	Well covered Moderate Fair Some covering Fat colour White Creamy Yellow	Well fleshed Moderate Fair	Nil Bruised	Choice ≤6 teeth (0 for bulls) Nil bone ossification Well fleshed Even fat cover Good marbling White or creamy fat ≥180 kg cold carcass weight	Prime ≤5 teeth heifers and steers Nil bone ossification Well fleshed Fair fat cover Fair marbling White or creamy white fat ≥146.5 kg cold carcass weight	Standard Moderately well fleshed Moderate fat cover Moderate marbling (bulls well covered)	Commercial Fairly well fleshed with some fat covering	Inferior Any carcasses below the standards of the other grades

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Fat cover	Conformation	Carcass damage					
Namibia	A = 0 AB = 1-2 B = 3-6 C = >6	Adult bull	0 = 0 mm 1 = 0.1-0.9 mm 2 = 1.0-3.0 mm 3 = 3.1-5.0 mm 4 = 5.1-7.0 mm 5 = 7.1-10.0 mm 6 = >10.0 mm	1 = Very flat 2 = Flat 3 = Medium 4 = Round 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					
Seychelles										
South Africa	A = 0 AB = 1-2 B = 3-6 C = >6	Adult bull	0 = 0 mm 1 = 0.1-0.9 mm 2 = 1.0-3.0 mm 3 = 3.1-5.0 mm 4 = 5.1-7.0 mm 5 = 7.1-10.0 mm 6 = >10.0 mm	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					
Tanzania	A = 0 AB = 1-2 B = 3-6 C = >6	Bull Bullock Steer Heifer Cow	0 = No fat 1 = Very lean 2 = Lean 3 = Medium 4 = Fat 5 = Slightly overfat 6 = Excessively overfat	Visual scores of 1 to 10	Zero damage Slight damage Damage Severe damage	Prime Age A, AB Fat cover 0-2 Slight to abundant marbling Conf 5-6 Sex Steer, heifer cow	Choice Age AB, B Fat cover 0-2 Slight marbling Conf 5-7 Sex Steer Heifer, Cow	Commercial Age B,C Fat cover 4-5 No marbling requirement Conf 8-9 Sex Steer	Standard Age B,C Fat cover 4-5 No marbling requirement Conf: 3.5–4 Sex: Bullock, bull cow	Utility Age A, AB, B, C Fat cover 5-6 No marbling requirement Conf 2-3 Sex Bullock, bull, steer, cow

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Fat cover	Conformation	Carcass damage					
Zambia						Super Age: <4 Sex: Steer, young bull Conf: Well fleshed. Fat colour: Silver/white	Choice Age: < 6 Sex: Steer, young bull, Conf: Well fleshed Fat colour: Whitish	Standard Age: Any Sex: Steer, bull, female Conf.: Well fleshed Fat colour: Yellowish	Commercial All other undamaged carcasses	Manufacturing Carcasses which are damaged and only fit for manufacturing
Zimba-bwe	0 = 0 2 = 1-2 4 = 3-4 6 = 5-6 FM = 7-8 FA = 7-8	CO = Female OX = Castrated male BY = Young bull BU = Adult bull	0 = 0 mm 2 = 3-6 mm 3 = 7-12 mm 4 = 13-18 mm 5 = 19-24 mm 6 = >24 mm	10 classes from Highest (A+) to Lowest (E-) derived from carcass weight to length ratio	1 = Undam-aged 2 = <2% of carcass weight trimmed 3 = >2% of carcass weight trimmed 4 = Trimming caused by abscesses and wounds	Super 0-6 teeth A2, 3; B2,3 FM A2,3; B2,3; C+ 2,3	Choice 0-6 teeth A1,4,5; C2,3	Commercial 0-6 teeth A0,6; B0,6; C+ 1,4,5; C- 4,5; D2,3,4,5	Economy 0-6 teeth C+0,6; C-0,1,6; D0,1,6; E1,2,3,4,5	Manufacturing Unclassified carcasses
							FM A1,4,5; B1,4,5; C+4,5; C-2,3,4,5; D2,3,4	FM A0,6; B0,6; C0,1,6; D0,1,5,6; E1,2,3,4,5,6		
							FA A1,2,3,4,5; B1,2,3,4,5; C1,2,3,4,5; D+2,3,4	FA A0,6; B0,6; C0,1,6; D-0,1,2,3,4,5,6; E2,3,4,5,6		

Only three countries in the region (Lesotho, Namibia and South Africa) use identical carcass classification systems, that is, they use identical classification criteria and identical classification classes within each criterion. Age classification classes in Eswatini and Tanzania are also identical to those of Lesotho, Namibia and South Africa.

Carcasses in Lesotho, Namibia and South Africa are marked and marketed based on the classification only, without combining the classification classes into grades, while all the other countries grade carcasses. Table 4.2 shows how the different countries combine the classification classes into grades. As with carcass classification, the number of carcass grades, their definition and description vary substantially between countries. A close analysis of Table 4.2 suggests that the major determinants of carcass grade also vary between countries. Apparently, age determines carcass grades more than other classification criteria in Botswana and Eswatini, while fat cover and conformation do so in Malawi and Tanzania, respectively. In Zimbabwe, carcass quality varies widely within the Commercial and Economy grades in terms of age (all age classes are represented within these grades), fat cover (all fat classes are represented) and conformation (all but class E are represented). Such wide variations within grades and their complexity raise doubt as

to the benefits of grading after classification. Secondly, the basis for grouping classification classes into the different grades is not clear.

4.2 Carcass classification and grading systems for sheep and goats

The situation regarding carcass classification and grading in sheep and goats resembles that in beef cattle discussed in Section 4.1 in terms of existence of grading systems and regulations. The major differences are that, as mentioned earlier, fewer countries have classification or grading systems for sheep and goats than those for cattle.

Tables 4.3 and 4.4 summarise the official carcass classification and grading systems for sheep and goats also compiled using responses from the questionnaires and from review of literature. The carcass classification and grading systems generally use the same or similar carcass classification criteria as those for beef cattle carcasses, namely, age and sex of the animal, fat cover, and carcass conformation. The number of carcass classification classes and their definition or description within criteria also vary substantially between countries:

- Age of animal at slaughter is determined in all countries based on the number of permanent incisor teeth.
- Sex of animal is recorded only in Botswana. Sex is also included in the carcass classification and grading system developed in 2011 in Tanzania, but the system is still not operational.
- Carcass fat content is determined visually in all countries
- Carcass conformation is assessed visually in all countries.
- Carcass damage is recorded in Lesotho, Namibia, and South Africa, and in the official classification system in Tanzania.

Carcasses are weighed in all countries. Only three countries in the region (Lesotho, Namibia and South Africa) use the classification system and market the carcasses without grading them. Tables 4.3 and 4.4 show how the different countries combine the classification classes into grades. Unlike classification and grading of beef carcasses, the descriptions of visually assessed carcass classification classes that constitute the marketing grades in goats and sheep are less well defined. Consequently, there are overlaps in some countries (e.g Botswana, Malawi) between the carcass grades derived from these classes. There is also substantial variation in carcass quality within grades as indicated by the wide range of classes within a classification criterion that constitute the grade. Such overlaps and the wide variations within grades also raise doubt as to the benefits of grading after classification, and the basis for grouping classification classes into the different grades

Table 4.3: *Sheep carcass classification and grading systems in SADC countries*

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them					
	Age (no. of permanent incisor teeth)	**Sex**	**Fat cover**	**Conformation**	**Carcass damage**						
Botswana						Prime Mutton Well fleshed evenly distributed fat cover, excludes Fat tailed carcasses. Derived from wethers and ewes	Grade 1 Mutton Reasonably fleshed, Fair finish, May include moderately overfat carcasses, Derived from wethers and ewes	Grade 2 Mutton Fair finish and poorly fleshed, or poorly finished and reasonably fleshed carcasses. Derived from wethers, ewes rams. Moderately overfat carcasses included	Grade 3 Mutton Carcasses which do not comply with aforementioned grades		
						Super Lamb Well finished and fleshed. Excludes fat-tailed type carcasses. Derived from wethers, ewe and ram lambs	Grade 1 Lamb Fairly finished, reasonably fleshed, Derived from wethers, ewe and ram lambs	Grade 2 Lamb Fairly finished, or poorly fleshed. Moderately overfat carcasses included. Derived from wether, ewe and ram lambs	Grade 3 Lamb Carcasses which do not comply with aforementioned lamb grades		
Lesotho	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe						
Malawi						Choice Lamb Good conformation, Even finish, No permanent incisors	Prime Lamb Good conformation finish and quality, No more than 2 permanent incisors	Grade 1 Mutton Reasonably good conformation, finish and quality, No more than 4 permanent incisors	Grade 2 Mutton Fair conformation and quality, More than 4 permanent incisors		

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them					
	Age (no. of permanent incisor teeth)	**Sex**	**Fat cover**	**Conformation**	**Carcass damage**						
Namibia	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe						
South Africa	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe						
Tanzania	A = 0 AB = 1-2 B = 3-6 C = >6	Ram	1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	Scored from 1 = Lowest conformation to 10 = Highest conformation	0 = No damage 1 = Damage 2 = Slight damage	Prime Age: A, AB Conf: 5-7 Fatness: 0-2 Marbling: Abundant	Choice Age: AB, B Conf: 5-7 Fatness: 0-2 Marbling: Trace/slight	Commercial Age: B Conf: 8-9 Fatness: 4-5	Standard Age: B, C Conf: 3.5 – 4 Fatness: 4-5 Sex: Billy/ Buck	Utility Age: AB, B, C Conf: 2-3 Fatness: 5-6 Sex: Ram	
Zimba-bwe	0 2 4 6 FM		1 = no fat or lack uniformity 2 = Uniform and fairly well covered 3 = Overfat	A = well fleshed B = Moderately fleshed C = Lack flesh development D = Poorly fleshed		Super Lamb <u>Age 0</u> Conf A, B Fat 1-2 <u>Age 2-4</u> Conf A, B Fat 1-2	Choice Lamb <u>Age 0</u> Conf C Fat 1-2 <u>Age 2-4</u> Conf A, B Fat 1-2	Standard Lamb <u>Age 0</u> Conf A, B, C, D Fat 1-3 <u>Age 2-4</u> Conf C Fat 1-2 <u>Age 6-FM</u> Conf A, B, C Fat 1-2	Mutton <u>Age 2-4</u> Conf A, B, C, D Fat 1-3 <u>Age 6-FM</u> Conf A, B, C, D Fat 1-3	Inferior Mutton Not classified	

Table 4.4: *Goat carcass classification and grading systems in SADC countries*

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	**Sex**	**Fat cover**	**Conformation**	**Carcass damage**					
Botswana						Super Grade Well fleshed, Well finished, No permanent incisors, Castrates and females	Grade 1 Reasonably fleshed, Fair finished, 1-2 permanent incisors, Castrates and females	Grade 2 Reasonably fleshed, Fair finished, Castrates and females	Grade 3 Carcasses that do not comply with the requirements as prescribed for the aforementioned grades	
Lesotho	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					
Malawi						Grade 1 Good conformation, Reasonable finish Not more than 4 permanent incisors	Grade 2 More than 4 permanent incisors			
Namibia	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					
South Africa	A = 0 AB = 1-2 B = 3-6 C = >6		1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = Very flat 2 = Flat 3 = Medium 4 = Round, 5 = Very round	1 = Slight 2 = Moderate 3 = Severe					

Country	Carcass classification criteria and classes within criterion					Carcass grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Fat cover	Conformation	Carcass damage					
Tanzania	A = 0 AB = 1-2 B = 3-6 C = >6	Buck	1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	Scored from 1 = Lowest conformation to 10 = Highest conformation	0 = No damage 1 = Damage 2 = Slight damage	Prime Age: A, AB Conf: 5-7 Fatness: 0-2 Marbling: Abundant	Choice Age: AB, B Conf: 5-7 Fatness: 0-2 Marbling: Trace/slight	Commer-cial Age: B Conf: 8-9 Fatness: 4-5	Standard Age: B, C Conf: 3.5 – 4 Fatness: 4-5 Sex: Billy/Buck	
Zimbabwe	0 2 4 6 FM		1 = no fat or lack uniformity 2 = Uniform and fairly well covered 3 = Overfat	A = well fleshed B = Moderately fleshed C = Lack flesh development D = Poorly fleshed		Super Goat Age 0-2 Conf A, B Fat 1-2 Age 4-FM Conf A, B Fat 1-2	Choice Goat Age 0-2 Conf A, B, C Fat 1-3 Age 4-FM Conf A, B, C Fat 1-2	Standard Goat Age 0-2 Conf C, D Fat 1-3 Age 4-FM Conf A-D Fat 1=3	Inferior Goat Not classified	

4.3 Status of policies and regulations governing carcass classification and grading systems

Virtually all countries in the region have some livestock policies, strategies or regulations (Tawonezvi, 2016). Few of these are stand-alone livestock policy documents, while most of the livestock policies and regulations are part of the overall national agricultural policy documents. Such policy documents largely cover aspects of livestock production, health, marketing and trade as well as control of importation of breeding stock and germplasm. As shown in Table 4.1 above regulations governing live animal and carcass classification and grading, if they exist, are not easily accessible in some countries.

The marketing policies and regulations dictate prices and the livestock production systems. Policies and regulations, such as those on classification or grading and pricing of livestock and meat, influence producers' decisions as to the appropriate breeding systems, the breeds to use and the production systems. Currently, these grading and marketing regulations favour the larger exotic breeds and their crossbreds because of their large size. Secondly, current carcass classification and grading systems in many countries in Southern Africa and markets exporting deboned beef also favour production from large exotic breeds. This however has little bearing on consumer preferences for the products on the domestic markets. The fact that producer prices are influenced by carcass size while consumer prices are driven largely by meat quality also indicates pricing policy distortions in the marketing chain. The current meat grading and pricing systems are therefore inappropriate incentives for producers and need to be addressed.

This study experienced considerable difficulty in accessing the relevant statutory instruments or regulations that govern the classification or grading systems in the respective countries shown in Table 4.1 above. Documents on classification or grading regulations are not readily available to stakeholders, including the respondents to the country questionnaires for this study. Analysis of the grading regulations available to this study indicate that many of the grading systems are rather old and have not been updated for decades. This suggests poor grading policies or policy implementation and low priority for carcass classification or grading as an activity in the value chains, particularly in those countries not involved in trade in livestock and meat products.

Carcass classification or grading is an essential part of efficient animal production, price determination and meeting consumer demands and preferences. Carcass classification (or grading) is based on the description of carcasses by means of clearly defined characteristics that are of prime importance to the meat industry, retailers and consumers. Good carcass classification or grading systems should comprise the following elements:

- Development of a carcass classification or grading system should be evidence-based to minimise undue human error.
- There should be clear differences between carcasses in different classes or grades and uniformity of carcasses within classes or grades.
- Classification or grading should be consistent and unbiased, not unduly favouring carcasses of certain animals or breeds over others.
- The classification or grading system should be easy to understand and to follow by stakeholders
- It should be implemented according to clearly laid out regulations on slaughter, carcass dressing and classification procedures. The regulations need to be enforceable and accessible to all stakeholders to achieve fairness, discipline and integrity in the management of the system.
- Implementation of the classification or grading system should be managed and monitored by institutions (public or private) with adequate and sustainable material, financial and human resources. Such institutions should collaborate with other institutions with identifiable comparative advantages, such as livestock R&D institutions, and relate well with all stakeholder entities in the value chains. When well designed and institutionalised, the classification/grading system can be financially self-sustaining.

The impacts of good and functional classification and grading systems include the following:

- They facilitate organised marketing, trade and quality-based pricing. This provides incentives to livestock keepers to produce slaughter animals that meet market demands.
- Participation of the majority smallholder producers of cattle, sheep, goats in the formal marketing systems can be achieved, especially when accompanied with targeted extension and advisory services as well as appropriate production and marketing incentives.
- Classification and grading systems are currently little understood by many stakeholders (farmers, retailers, consumers, policy makers). Developing good and functional systems that are simpler and easy to understand across stakeholder groups in the value chains is possible and will lead to their increased participation and enhance their understanding of how the classification/grading systems work. This will spread more widely the benefits from livestock production, marketing and trade, thus increasing the number of households benefiting. To date, poor classification and grading systems have only benefited

a limited number of stakeholders in the value chain, mainly commercial cattle producers, abattoir operators and traders.

- Good classification/grading systems will have clearer policies, regulations and institutional arrangements, which will incentivise producers and facilitate orderly marketing.
- A policy that promotes participation of smallholder livestock keepers is also expected to result in increased use of indigenous breeds, the main source of these genetic resources in the region. Being more adapted and more productive overall, they are more suitable than exotics for finishing on the predominant range grazing systems. This is an area that requires attention because of its potential contribution to climate change mitigation, given the lower carbon footprint of finishing animals off grass (Gerber et al., 2013; Box 4.1)

Box 4.1: The importance of policies that promote commercial rearing of indigenous breeds

Research in the SADC region (see Tawonezvi et al., 2021) has consistently shown that indigenous breeds are more productive than the exotics because of their superior adaptability. They grow faster relative to live weight than the exotic breeds on range grazing and compete favourably against the exotic breeds in meat quality attributes. They are therefore the breeds of the future in the context of increased livestock productivity and in contributing to climate change mitigation in the region.

The preference for large exotic breeds and the commonly held view that indigenous breeds are less efficient particularly in feedlot finishing systems have become outdated and misplaced. Breeds of different mature size show similar efficiency when reared to produce carcasses of the same composition or fatness, with the smaller indigenous breeds attaining that carcass composition sooner and at lower weight than the larger exotics (see Box 4.3). In other words, any breed, large or small, can be finished efficiently in feedlot to yield carcasses of a desired quality, and it must be recognised that the different breeds achieve that carcass quality and efficiency at different final weights and feeding periods determined by their inherent mature size.

Discussions on the policies in carcass and live animal classification and grading systems with stakeholders in the meat value chains often quickly drift to focussing on the beef exports overseas, with less attention paid to classification or grading requirements for the domestic or regional markets and little or no attention on the need to promote the use of the predominant indigenous breeds. This is even though the share of the export markets is small or absent in most countries in the region when compared to the domestic markets. Policy makers need to recognise that most of the beef and virtually all the sheep and goat meat produced in the region come from the indigenous livestock and are marketed and consumed locally. Therefore, policies promoting food and nutritional security should prioritise sustainable domestic production, marketing and consumption of meat and meat products, rather than prioritising exportation outside the region. The policies should also recognise the current and potential role of indigenous breeds, with niche or other special markets and exportation of red meat outside the region given appropriate and realistic emphasis and support. Carcass classification requirements for these niche and export markets can be derived from a harmonised regional classification system without the need for separate systems.

4.4 Gaps in current carcass classification and grading systems

4.4.1 Shortcomings of the carcass classification and grading systems

The outdated nature and the apparent absence of the classification and grading systems in most countries in the region are important shortcomings. They result in the continued predominance of informal marketing of livestock and livestock products, which disadvantages livestock keepers as it provides little incentives for them to improve their productions methods. It also disadvantages traders and consumers from accessing better quality livestock products and the country's competitiveness on the regional or international markets.

In the absence of functional carcass classification systems in many of the countries in the region, and the poor implementation environment, SADC member states need to collaborate in the development of a unified regional carcass classification system. Such collaboration will allow member states to pool their limited resources to develop and implement the unified regional system. Most of the current national carcass classification and grading systems were developed many years ago and evolved from systems used in developed countries. There is clearly an opportunity to update them and come up with improved national systems or a harmonised regional system. Therefore, regional collaboration will be necessary in developing carcass classification and grading systems that recognise the unique carcass quality attributes of indigenous breeds and suitable production and marketing systems (Box 4.2).

Box 4.2: Effect of age and finishing system on carcass quality of Sanga cattle breeds and implication to carcass classification and grading

Research in South Africa and elsewhere in the world (Chingala et al., 2017) has shown that Sanga breeds produce tasty beef with outstanding tenderness qualities similar to those of British and European breeds. Although young animals produce more tender carcasses than older ones, pastured animals aged 3-6 tooth have been found to produce tastier meat than 0-2 tooth pastured animals. Quality considerations, therefore, suggest combining age into about three classes, namely, 0-2 tooth, 3-6 tooth and older animals. That would also minimise the current age discrimination against animals finished on range, which includes most of the early maturing breeds considered ideally suited to pasture finishing without the need for pen feeding.

4.4.2 Biases of carcass classification and grading systems

The systems of production, grading and marketing carcasses in Southern Africa have been contentious because they generally favour large-framed breeds, which are predominantly the exotic breeds, and discriminate against small-framed breeds which are predominantly the indigenous types. These biases largely emanate from the use of absolute growth rate of individual animals as a criterion to determine production efficiency in meat animals, and from incorporating in the classification and grading systems criteria that are not independent of live weight or carcass weight, such as fleshing index in Zimbabwe, and setting minimum weights for specific grades (Box 4.3). This has led to the erroneous belief that indigenous breeds, being generally smaller, are inferior and less efficient than the exotics. Consequently, production and grading systems have generally discouraged commercial production and marketing of indigenous meat animals. This has also resulted in indiscriminate crossbreeding under conditions of uncontrolled mating, in

attempts to increase the size of indigenous livestock. There is therefore a need to build awareness of the merits of indigenous breeds and to promote their commercial utilisation.

Box 4.3: Indigenous breeds are discriminated against in commercial production and grading systems

Breed bias in production systems

The common systems of finishing slaughter animals of all species over a fixed age on range or fixed time period in feedlot promote large breeds and discriminate against the relatively small indigenous breeds because large breeds grow faster and are more feed efficient. This has led to the erroneous belief that indigenous breeds are biologically less efficient, making them less preferred in finishing systems and attracting low purchase prices per kg by traders buying in animals for pen finishing.

It has long been established (e.g. Berg and Butterfield, 1976) that when breeds of different mature size are compared at a fixed time interval or at the same chronological age, as is common practice in most feedlot systems, late maturing breeds show faster absolute growth rate and higher absolute feed conversion efficiency because they are physiologically younger. They yield heavier and leaner carcasses than early maturing breeds. When the same breeds are slaughtered at the same live weight, the larger breeds gain weight faster and more efficiently and attain the target slaughter weight at a younger chronological age than the smaller breeds. Their carcasses will be leaner and more tender than those of animals from the small breed. On the other hand, when the same breeds are finished and slaughtered at the same stage of maturity or fatness, they will be similar in overall feed conversion efficiency and carcass composition but will differ in slaughter weight and age, with the early maturing breeds being chronologically younger and lighter than the late maturing breeds.

Thus, differences between breeds in absolute growth rate, absolute feed conversion efficiency and carcass composition, depend on the basis of the comparison, i.e. whether the breeds are compared at the same age, same weight, or same level of maturity or fatness. The high growth rates and feed conversion efficiency of the large, late maturing exotic breeds compared with the smaller indigenous breed types commonly observed in feedlots are mainly scale (size) differences. It is a result of comparing breeds at different levels of physiological maturity, rather than a result of inherent differences in biological efficiency. This means that, in general, the smaller indigenous breeds are biologically just as efficient as the large breeds in terms of producing carcasses of desired quality. To achieve that carcass quality, breeds of different mature size will require different feeding periods, different induction weights and different slaughter weights, and will yield carcasses of correspondingly different sizes[2] .

[2] *For example, Tawonezvi et al. (2021) report experiences with pen fattening studies in Zimbabwe, which showed that the early maturing indigenous beef cattle breeds (Mashona and Tuli) aged 18 months at induction required 60 to 70 days in feedlot to attain the desired level of carcass finish. One advantage of these indigenous breeds over the exotics was that two consecutive batches of steers could be finished in the open pens before the onset of the next rainy season, thus increasing production turnover and use of the feeding facilities. On the other hand, the larger, late maturing breeds required over 90 days in feedlot to produce carcasses of the same finish as the indigenous breeds. This meant that only one batch of steers of the large breeds could be finished in the feedlot before onset of the next rainy season.*

Breed bias due to inclusion of carcass weight in the determination of carcass grade

The main reason of grading carcasses is to combine the different classification classes into grades in order to determine the price for each carcass grade and facilitate marketing. Then the value of the carcass is simply the product of carcass weight and carcass grade price. The carcass value would be unbiased if none of the carcass classification criteria is correlated with grade price. Table 4.1 shows that carcass weight is included in determining marketing grades in Malawi, with heavy carcasses designed to attain better grades than light ones. This effectively amounts to factoring carcass weight twice, which would result in price discrimination against carcasses of small animals or breeds. Therefore, carcass weight should not be included to determine carcass grade unless quality grade is determined separately from yield grade.

Breed bias due to Fleshing Index as a measure of carcass conformation

Fleshing Index, the official measure of beef carcass conformation in Zimbabwe, is the major determinant of the grade and the financial value of a carcass, with carcass fatness and slaughter age contributing substantially less to carcass grade and price. Fleshing Index is meant to measure objectively the contribution of carcass conformation to meat yield independent of carcass size and fatness. The Fleshing Index in Zimbabwe fails to do this because it is not independent of size of the carcass. About 65 % of the variation in fleshing index is explained by carcass weight (Tawonezvi et al., 2021). Large breeds and large animals within breeds are classified and graded as having better carcass conformation and therefore fetch higher carcass prices per kilogram than small ones. There are two main consequences of this grading bias. First, small breeds, which include the indigenous cattle, are not preferred by most commercial beef producers, even though they are more productive and compete favourably in meat quality compared with the breeds preferred in the commercial farming sector. Second, producers of small breeds often finish their slaughter animals for longer periods in attempts to achieve heavier carcass weights and therefore better carcass grades. This however results in the production of old and fat animals, which is less efficient. Thus, Fleshing Index in the Zimbabwean grading system is a major disincentive to the rearing of the more adapted and productive indigenous cattle breeds. Due to this bias against small animals and breeds, fleshing index has largely been abandoned in practice in favour of visual assessment, but because of the arbitrary nature of the informal change to visual conformation assessment, poor standardisation and lack of training of graders, however, use of the new visual conformation classification still seems to discriminate against small breeds.

4.5 Opportunities in current carcass classification and grading systems

4.5.1 Promote increased commercial utilisation of indigenous breeds

Indigenous breeds of beef cattle, goats and sheep in southern Africa have been shown to be more productive overall than the exotics because of their superior adaptability which results in superior fertility, survivability and relative growth rate on range grazing (Tawonezvi et al., 2021). Even though the indigenous Sanga cattle breeds are as efficient and yield carcasses of similar or better quality compared with European breeds, the exotic breeds have continued to be promoted ahead of indigenous breeds. Meat quality attributes are however not considered in carcass classification, yet meat from indigenous breeds is often preferred by most consumers in the region (Box 4.4). There is therefore strong justification and opportunity to promote production of indigenous breeds ahead of the exotic livestock. Secondly, there is need to match breeds with production systems and methods to maximise productivity.

Box 4.4: Meat from indigenous livestock is preferred by African consumers

Discussions with smallholder cattle keepers reveal that most of them show preference for indigenous livestock over exotics for several reasons. These include the following:

- *Higher fertility and survival rates of indigenous livestock, as well as shorter parturition intervals. These traits enhance herd and flock growth and reduce production costs.*

- *Better eating quality of meat from indigenous livestock breeds. This is supported by research findings in the region. Several studies in beef cattle reviewed by Chingala et al. (2017) and Tawonezvi et al. (2021) show that meat tenderness and flavour of Sanga cattle are similar to those of European beef cattle and more tender and juicier than meat from exotic Zebu cattle (Boran and Brahman) which are being promoted in the region ahead of local breeds.*

Meat quality attributes have however received virtually no attention in livestock research and development in all countries of the region except in South Africa, and are not considered in carcass classification, grading and marketing systems. There is therefore a need to consider meat quality attributes in livestock research and development in the region, so that breed promotion and carcass grading and pricing systems are responsive to consumer preferences.

4.4.2 Promote inclusivity

There are opportunities to develop production systems that do not only focus on commercial livestock producers but also deliberately promote the participation of smallholder producers, who are the main sources of slaughter stock in the region. This would include production and finishing systems that do not discriminate against the indigenous and other locally adapted breeds in line with global trends of promoting utilisation of these animal genetic resources. This will encourage the majority smallholders rearing predominantly indigenous breeds to participate in commercial livestock production and marketing, thus enhancing national or regional livestock production and productivity.

4.4.3 Leveraging on public-private partnerships

Until the 1980s and 1990s, slaughterhouses and the business of classifying and grading carcasses and selling the carcasses to retailers have were the preserve of governments. Following liberalisation of the national economies, several private abattoirs have been established and this has resulted in a substantial increase in demand for grading services by government graders at a time when the financial and human resources of the public sector agencies responsible for carcass grading were generally on the decline. They have therefore, not been able to provide enough graders and adequate resources. Consequently, maintenance and supervision of the grading standards have generally deteriorated. This has contributed to the dysfunction of some of the grading systems referred to earlier in this report. One way to address this challenge is to explore the possibilities of establishing partnerships between the public sector and private sector entities (PPP) in ways that restore and sustain the viability of the national live animal and carcass classification and grading services. This could include part of the usual levies paid by livestock owners for the grading of their animals sold live through public auctions or slaughtered at registered abattoirs. The responsibility of classifying and grading animals and carcasses cannot continue to be borne entirely

by national governments. Models for such PPPs can be developed at regional level as templates to assist individual Member States.

4.4.4 Improvement of classification criteria

The carcass classification criteria of fat cover, conformation and bruising are assessed visually in most countries in the region and elsewhere in the world. This makes such assessments subjective and prone to human error and preferences of individual graders. In other countries in the world, visual assessments are accompanied with the use of reference photographs to standardise classification and minimise subjectivity. Only three countries in the region (Lesotho, Namibia and South Africa) use reference photographs to aid visual assessment. The use of reference photographs increases accuracy and reliability of visual assessments and needs to be considered for wider adoption in the region.

The current use of widely different definitions of the classification criteria and of the classification classes within criteria, results in limited comparability of carcass classification systems between countries in the region. There is opportunity to make adjustments necessary to harmonise carcass classifications in the region.

5. STATUS OF NATIONAL SYSTEMS FOR CLASSIFICATION AND GRADING OF LIVE ANIMALS

Responses to the questionnaire on live animal classification and grading were received from six SADC member states, namely, Botswana, Eswatini, Malawi, Tanzania, Zambia and Zimbabwe. The respondents comprised stakeholders in animal production, value addition, trade, marketing and legislation. About 86 per cent of the respondents had no formal training on classification of animals. Their knowledge on carcass classification and grading issues was therefore based on in-service training and practical field experience. All the respondents answered questions relating to beef cattle. As mentioned in the previous in Section 4, there is currently no known formal classification or grading system in place for live goats or sheep in any of the member states in the SADC region.

5.1 Classification and grading of live cattle

Table 5.1 summarises the carcass classification and grading systems in the six countries that responded to the questionnaires. The Table was compiled using the responses to the questionnaires and from review of literature. The system in Zambia is still a draft yet to be officially launched, and the extension offices have not yet been trained to implement the guidelines. The extent to which all the grading systems in the other countries in Table 5.1 are being implemented could not be established, nor are the types of livestock owners using this system to market their animals. These are some of the issues that the participants to the proposed validation workshop will be expected to clarify.

Age, sex and body condition are the main criteria used in classifying and grading the animals. These three grading criteria are used in all the countries except Botswana, which does not include body condition score. Body conformation is used only in Zimbabwe, while live weight contributes to determining grade in four of the six countries in Table 5.1. Thus, although some of the classifications criteria are fairly similar,

the description of the grades and the classification classes that constitute them vary substantially between countries, therefore, making the grading systems substantially different between countries.

Table 5.1: *Classification and grading systems for live cattle in SADC countries*

Country	Live animal classification criteria and classes within criterion					Live animal grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	**Sex**	**Condition score (CS)**	**Conformation**	**Live weight**					
Botswana	0-2 3-4 5-8	Young bulls Mature bulls Cows Heifers Steers Oxen			All market animals to weigh 190 – 500 kg	Grade A 0-2 teeth All sexes	Grade B 3-4 teeth All sexes	Grade C 5-8 teeth All sexes		
Eswatini	0 1-2 3-6 >6	Young bulls Mature bulls Cows Heifers Steers Oxen	1 = very thin 2 = thin 3 = moderate 4 = fat 5 = overfat			Super 0 teeth Steers and heifers	Prime 1-2 teeth Oxen, steers, heifers Well fleshed	GAQ 3-6 teeth Oxen, steers Cows Heifers in good condition	FAQ >6 teeth Cows, oxen, Moderately fleshed	Compound Worn out teeth, all cattle of inferior quality
Malawi	0-2 2-3 4-6 7-8	Young bulls Mature bulls Cows Heifers Steers Oxen	1= blocky 2= filled up and round 3= ribs slightly showing 4 = bones and ribs showing 5= emaciated			Feeder A (Choice) 2-3 teeth >250 kg	Feeder B (Prime) 4-6 teeth >225 kg	Standard Well fleshed Medium condition	Commercial Reasonable condition	Inferior Animals below aforementioned grades
Tanzania	A = 0 teeth B = 1-2 teeth AB= 3-6 teeth C= >6 teeth -	Steer Heifer Cow Young bull Bull Bullock	1 = low, emaciated 9 = overfat		All animals to weigh 80 to over 500 kg depending on sex and grade	Prime Age A, AB CS 5-6 Weight depending on sex	Choice Age A, AB CS 5-7 Weight depending on sex	Commercial Age B,C CS 8-9 Weight depending on sex	Standard Age B, C CS 3.5 – 4 Weight depending on sex	Utility Age A, AB, B, C depending on sex Weight depending on sex
Zambia	A <24 mth B 25–30 mth C 31-36 mth D 37-42 mth E >42 mth	Young bulls Mature bulls Cows Heifers Steers Oxen	1= very thin 2= thin 3= good 4= fat 5= overfat			Prime A4, A5	Choice A3, B3, C3, B4, C4, B5	Standard D3, E3, C5	Commercial A2, B2, C2, D3, E3, D4, E4, D5, E5	Ungraded A1, B1, C1, D1, E1

Country	Live animal classification criteria and classes within criterion					Live animal grades and the classes that constitute them				
	Age (no. of permanent incisor teeth)	Sex	Condition score (CS)	Conformation	Live weight					
Zimbabwe	0 1-2 3-4 5-6 7-8	Young bulls Mature bulls Cows Heifers Steers Oxen	1= very thin 2= thin 3= good 4= fat 5= overfat	Convex Linear Concave	All animals to weigh at least 255kg	Chiller 0-6 teeth CS 5 All sexes except mature bulls and cows >340 kg	GAQ 0-7 teeth CS 4 All sexes except mature bulls and cows .>320 kg	FAQ 0-8 teeth CS 3-6 All sexes >300 kg	Inferior CS 2 All sexes	Manufac-turing Animals below aforemen-tioned grades

5.2 Current status of policies and regulations governing live animal classification and grading systems

The existence of livestock policies, strategies, regulations and the challenges in respect of carcass classification, grading and marketing described in Section 4.3 also apply to classification, grading and marketing of live animals. The current systems discussed in this report largely relate to beef cattle, as there are no classification or grading systems for live goats or sheep. The marketing policies in the region also dictate prices, the production systems and choice of breeds. These marketing policies also favour the larger exotic breeds and their crossbreds because of their large size. The current live animal grading and pricing systems are therefore inappropriate incentives for the production and marketing of indigenous animals.

This study also experienced considerable difficulty in accessing the relevant statutory instruments or regulations that govern the classification or grading systems for live animals as discussed in Section 4.1 for carcass classification and grading regulations. Most of the grading systems that were accessed during this study have not been updated for decades. There is clearly a need to upgrade these classification, grading and marketing policies and regulations for live cattle, and to develop policies, strategies and regulations that govern and promote classification or grading of live goats and sheep.

The impacts of good and functional live animal classification and grading systems are similar to those presented for carcass classification and grading. These were extracted from the responses to the questionnaires and from review of literature. They can be summarised as follows:

- Development of a formally established grading and marketing system helps to establish market driven prices and minimise perceived rip off by middlemen. Producers will have a bargaining power and not lose out to middle-men or other traders.
- When accompanied with training and capacity building, it brings better understanding of the animal grade for various uses including breeding and marketing
- It can lead to development of farmer groups or associations promoting production and marketing of animals and for advocacy and lobbying policy makers.
- It makes pricing more uniform based on grade and enables producers to manage their market animals in response to market demands

- It enables a systematic way of setting prices of livestock based on set grades

5.3 Gaps in the current classification and grading systems

5.3.1 Shortcomings of the live animal classification and grading systems

The outdated nature of the live cattle grading systems in most countries and the absence of such systems for live goats and sheep in all countries are important shortcomings. Like in carcass classification and grading, they result in the continued predominance of informal marketing of livestock. This often disadvantages livestock keepers as it does not protect them from unscrupulous middlemen. It therefore provides little incentives for them to improve their productions methods. It also disadvantages traders and consumers from potentially accessing livestock that would otherwise have been of better quality.

Analysis of Table 5.1 above shows that the grades used within the different countries are unnecessarily complex. Many producers and other stakeholders, probably most, are unlikely to follow and understand these grades and make production or marketing decision based on them. For example:

- In the grading system in Zimbabwe, only condition score and live weight separates the grades, while age and sex classes overlap across the grades. Conformation is measured but it does not seem to contribute to the grades.
- In Eswatini, age and sex are the basis for formulating the grades. The condition and the fleshing of the animal are mentioned as also determining the grade, but body condition and fleshing are not included in the classification.
- As mentioned earlier, the Zambian grading system is still a draft still to be launched, but it is pertinent to observe that age is intended to be measured in months. It will be interesting to establish how age would be recorded if the date of the animal will be unknown. All other countries estimate age from dentition which does not require having to know or estimate birth date
- The classification class combinations within a grade in both Zambia and Tanzania are many. It can be challenging to timeously determine the grade of an animal during an auction process handling a large yarding.

Another important shortcoming is the relationship between carcass grading and live animal grading. Ideally, live animal grades should reflect the expected carcass grades. Analysis of the findings in Table 4.2 for beef carcass grading with those in Table 5.1 for live cattle grading suggests significant lack of congruency between the two grading systems within a country. This will pose challenges in production and marketing decisions. There is need to revise these systems so that they demonstrate strong positive correlation.

Furthermore, the current use of widely different definitions of the classification criteria and of the classification classes within criteria, limits comparability of carcass classification systems between countries in the region. Therefore, significant adjustments will be necessary to harmonise carcass classifications in the region.

The role of the private sector in the marketing of live animals seem to vary considerably between countries. In some countries, private auctioneers conduct sales of animals largely from commercial producers, with

government playing a dominant role in the auction of animals from the smallholder livestock sector. These grading systems are not always the same. The classification and grading systems for live animals presented in Table 5.1 are the official systems provided by government graders. The use of different systems of grading live animals according to farming sector in the same country brings confusion in the production and marketing chains and can result in biases against animals from one sector. There is therefore a need to remove such dichotomy.

5.3.2 Biases observed in the current grading systems for live animals

Although the respondents to the questionnaires in all countries, except Malawi, considered that the live cattle grading system does not discriminate against indigenous breeds, all the grading systems in Table 5.1 that incorporate live weight in determining the grade are biased against small animals and breeds. For example, young steers in Malawi can meet all the required quality criteria to attain the best grade of Choice but fail to achieve this grade because of weight restrictions. Thus, there is bias against indigenous breeds in both carcass grading and live animal grading, which discourages the commercial production and marketing of these breeds. Despite this clear bias, systems that include weight in determining marketing grade of live animals or carcasses continue to be developed and promoted (Box 5.1). Like carcass weight, live weight should also not be included in the determination of grade price because this amounts to factoring live weight twice in establishing the market value of an animal. The unbiased market value of an animal should simply be the product of live weight and grade price independent of live weight.

Box 5.1 Indigenous cattle, goat and sheep breeds will be discriminated against if live weight is included in determining marketing grades

It is noteworthy that the harmonised regional grading systems for live cattle, goats and sheep developed recently by COMESA (2019) include weight in determining marketing grade. They also include visual conformation in which large-framed animals are classified as having better conformation than small ones. Such grading systems will discriminate against small animals and breeds and will perpetuate the current bias against indigenous livestock, which are adapted and relatively more productive than the exotics. They also disadvantage the majority livestock producers.

Removal of these biases in grading and marketing systems can be expected to result in more realistic market prices of indigenous breeds, which should encourage their commercial production. Given the numerical strength of indigenous cattle, goats and sheep in the region, their promotion and commercial utilisation can have a huge impact on the livestock sector. This calls for a major revision of the live animal and carcass grading systems and a paradigm shift in the way in which the region manages and utilises its animal breed resources.

5.4 Opportunities in the current live animal classification and grading systems

5.4.1 Promote formal marketing and commercial utilisation of indigenous breeds

The superior productivity of indigenous breeds, their unique characteristics and predominance over the exotics have been highlighted in this report. There is therefore strong justification and opportunity to

promote commercial production of indigenous breeds ahead of the exotic livestock. Such promotion should also include provision of formal markets and infrastructure, like auction centres readily accessible to livestock keepers in the smallholder farming areas where these breeds are predominant. Coupled with realistic and non-discriminatory classification and grading systems, this is expected to increase the contribution of indigenous livestock in the commercial production and formal marketing systems.

5.4.2 Promote inclusivity

As was stated in Section 4.4.2, there are opportunities to develop production systems that deliberately promote the participation of smallholder producers, the main sources of slaughter stock in the region. This would include production and marketing systems that do not discriminate against the indigenous and other locally adapted breeds. Such strategies are expected to encourage participation of indigenous livestock keepers and enhance livestock production and offtake rates within Member States and the region as a whole.

5.4.3 Improvement of classification criteria

Body condition in live animals is assessed visually in all countries in the region and elsewhere in the world. This assessment, being subjective, is prone to human error and to preferences of individual graders. In other countries in the world, the visual assessment is accompanied with the use of reference photographs to standardise classification and minimise subjectivity. Apparently, none of the countries in the region assess body condition with the aid of photographic references. The use of reference photographs increases accuracy and reliability of visual assessments and needs to be considered for wider adoption in the region.

As was observed under carcass classification and grading, the current use of widely different definitions of the classification criteria and of the classification classes within criteria, also results in limited comparability of live animal classification systems between countries in the region. There is opportunity to harmonise these live animal classifications.

6 ROADMAP TO DEVELOPING HARMONISED REGIONAL LIVE ANIMAL AND CARCASS CLASSIFICATION AND GRADING SYSTEMS

6.1 Rationale and justification

Livestock constitute an important agricultural resource in the SADC region, with over 60 per cent of the region's total land area suitable for livestock farming, contributing significantly to food security in the region (SADC, 2020). Much of the region is arid to semi-arid, which makes ruminant livestock production the most viable agricultural activity. About 75 per cent of the livestock population is kept under smallholder commercial and subsistence farming systems. Livestock production in the region offers an opportunity for accelerated economic growth, but this is hampered, among other factors, by low productivity, poor market access and marketing infrastructure for the hitherto marginalised smallholder livestock keepers. Therefore, development activities for the livestock sector should contribute to increased production and market access for livestock and livestock products.

Classification and grading of livestock and their carcasses are a critical activity in the marketing of livestock and meat products. SADC member states use different livestock classification and grading systems and methods for market animals. The methods used are largely informal, with formal marketing channels and grading systems used by relatively few stakeholders in the value chains, such as large-scale commercial farmers, livestock traders and middlemen. Most producers and other stakeholders do not have much say on how the grading standards were developed and applied in their countries and therefore, do not draw many benefits from them. The few formal classification and grading systems that have been developed are mainly intended for national markets. The existing systems are largely not in synchrony with current knowledge about meat quality attributes and how these are influenced by several factors, including breeds, production systems, slaughter procedures and meat processing. The countries in the region therefore fail to benefit from regional trade in livestock and livestock products. Development of a harmonized live animal and carcass classification systems will therefore provide opportunity for member states to harmonise their standards and facilitate cross-border trade. A regionally harmonised classification system will also improve both local and regional communication between producers, traders and processors, and enhance the quality of live animals or animal products traded. This may influence meat price parity in the region, is expected to stimulate improved herd or flock management and to facilitate the development of price setting mechanisms.

The need to develop harmonised classification and grading systems for livestock and carcasses in the SADC region has been widely recognised and was endorsed by all the respondents from the member states that completed the questionnaires for this study. This is in line with the recommendation by the regional workshop held in Seychelles in 2020.

6.2 Approach

Development of the proposed regional classification and grading systems took into account the following considerations:

1. The need to develop classification systems based on classification criteria that are realistic, taking into account the situation in the region, the technologies and resources that are available and accessible to Member States.
2. Identify commonalities between countries in the current classification/grading systems and, where practical, use the commonalities as templates for harmonisation.
3. Preference was given to classification criteria and classification classes that can be easily and objectively measured.
4. For a criterion where classification classes are to be assessed visually or subjectively, standard reference photographs will be provided to minimise variation due to grader preferences.
5. Allow room for countries to subdivide or combine certain classification classes to suit their specific country needs, but still maintain comparability of classification between countries.
6. Need to harmonise classification systems and approaches between species.

6.3 Determining classification criteria and the classes

6.3.1 Proposed classification criteria

The main carcass classification criteria used in all countries in the region and globally are: age of animal, sex, fat cover, conformation and carcass damage. These are generally the same criteria used globally (Chingala et al., 2017; Dlamini et al., 2020) and will be used in this proposal. Fat colour is a classification criterion in a few countries but is ignored in this proposal because preference for creamy white fat over yellow fat discriminates against carcasses of animals finished on grass, the predominant finishing system in the region, yet yellow fat is nutritionally better than white or creamy fat .

The selected classification criteria for carcasses are the same as those for classification of live animals, except that fat cover in carcasses is replaced by condition score in live animals (Table 6.1).

Table 6.1: *Proposed classification criteria and their assessment*

Classification criterion	Carcasses	Live animals	Type of assessment
Age	√	√	Number of permanent incisor teeth
Sex	√	√	Visual
Fat cover	√	-	Back fat depth (mm) for cattle carcasses
Visual subcutaneous fat cover for goat and sheep carcasses			
Conformation	√	-	Visual
Body condition	-	√	Visual
Carcass damage	√	-	Visual

6.3.2 Proposed classification classes

6.3.2.1 Age of animal

Five countries in the region (Eswatini, Lesotho, Namibia, South Africa and Tanzania) use the same classification classes for age, namely, 0, 1-2, 3-6 and over 6 permanent incisor teeth. Research findings have shown that young animals produce more tender carcasses than old ones. Categorising slaughter animals with milk teeth as a separate class will probably be appropriate in systems in which young animals are finished in feedlot, as is common practice in South Africa where over 80 per cent of slaughter animals from commercial farms are pen finished at milk tooth. However, the situation is quite different in the rest of the region where animals are predominantly finished on natural rangeland, and at older age. Review of literature suggests that animals aged 1-2 tooth produce tastier meat than 0 tooth animals (see Chingala et al., 2017). Therefore, combining the 0 and the 1-2 tooth age classes into one class (0-2 tooth) seems reasonable because overall quality differences due to age are small. This would also minimise the current age discrimination against animals finished on range, which includes most of the early maturing indigenous breeds considered ideally suited to pasture finishing. If any of the countries prefers to retain the 0 and 1-2 tooth age classes, they could do so for their domestic purposes by considering them as sub-classes of the 0-2 tooth age class.

Thus, the proposal is to harmonise the age classes to three: 0-2, 3-6 and over 6 permanent incisors, with individual member states having an option to subdivide the new 0-2 tooth age class into two sub-classes of 0 and 1-2 tooth.

6.3.2.2 Sex of animal

Published research has long established that adult uncastrated males showing male secondary sex characteristics produce inferior quality carcasses than the other sex classes. Therefore, the general practice is to record only old bulls showing these secondary sex characteristics, usually bulls over 2-tooth old. It is proposed that the harmonised classification system only record mature males showing the secondary sex characteristics.

6.3.2.3 Fat cover

Carcass fatness in beef cattle is measured almost equally by objective measurement of back fat depth or visually in the region. As stated earlier, objective assessment should be the preferred option. All countries except Zimbabwe that measure back fat use the same system. It is therefore proposed that this fat measurement classification be adopted in the harmonised beef classification system.

Visual assessment is used to classify goat and sheep carcasses by all countries in the region, again with three countries using the same classification classes. It is similarly proposed that the visual description of fat cover in sheep and goats and the classification classes be adopted in the harmonised system.

6.3.2.4 Carcass conformation

It is proposed that the carcass conformation classes used in Lesotho, Namibia and South Africa be adopted in the harmonised system. Carcass conformation is included in the carcass classification system because it is an important selling point for certain markets and it has become customary to record it. Otherwise, it has long been established (e.g. Kempster et al., 1982) that the contribution of carcass conformation to saleable meat yield independent of carcass weight and fatness is small.

6.3.2.5 Carcass damage

The classification classes used to record carcass damage vary between countries, again except, Lesotho, Namibia and South Africa, which use the same recording system. Tanzania has the same system but with an additional class for undamaged carcasses. It is proposed that the carcass damage classes developed in Tanzania be adopted in the regional classification system. Thus, the harmonised classification system will have four classes for carcass damage.

6.3.2.6 Body condition score

Four countries in the region (Eswatini, Malawi, Zambia and Zimbabwe) have adopted the usual 5-point body condition scoring system for live animals that has become the standard globally. It is proposed that this also be the standard for the regional classification system.

6.4 Proposed regional classification system for adoption

This proposal attempts to harmonise and standardise several aspects of live animal and carcass classification systems in the region as follows:

- Harmonised live animal and carcass classification criteria, together with standardising their names and descriptions across species

- Harmonised live animal and carcass classification classes, together with standardising their names and descriptions, and how they are recorded across species

Such standardisation is necessary for simplicity. The use of the same classification criteria and their classification classes across species will simplify matters and help avoid confusion. This will also facilitate training and capacity building of the graders and other value chain actors. Table 6.2 summarises the proposed classification systems. The proposed classification criteria are intended to assess quality aspects of carcasses and live animals and it is important to note that live weight or carcass weight are not included in the classification systems. Therefore, the classification systems per se do not discriminate against any breeds.

Based on the approach presented in Section 6.2 above and the proposed classification criteria presented in Section 6.3.1, it turns out that the classification system used in Lesotho, Namibia and South Africa best represents what is required for a harmonised regional system. It is therefore proposed that this classification system be adopted for the region, with the following modification:

- Age classes 0 and 1-2 tooth to be combined to make a class 0-2 tooth as suggested in Section 6.3.2.1
- Fat cover in beef carcasses to be assessed objectively, i.e. by measurement
- Carcass damage classification to include class 0 for undamaged carcasses
- Body condition score in live animals to be based on the 5-point classification system as proposed in Section 6.3.2.6

This means that the regulations in current use in these three countries will be the template for developing regional regulations. They should be revised accordingly and include a section on live animal classification.

Table 6.2: *Summary of proposed live animal and carcass classification criteria and classes for beef cattle, goats and sheep*

Classification criterion	Carcass classification classes			Live animal classification classes			
	Cattle	Goats	Sheep	Cattle	Goats	Sheep	
Age (dentition)	0-2 3-6 >6	0-2 3-6 >6	0-2 3-6 >6	0-2 3-6 >6	0-2 3-6 >6	0-2 3-6 >6	
Sex	Entire males > 2 tooth	Entire males > 2 tooth	Entire males > 2 tooth	Entire males > 2 tooth	Entire males > 2 tooth	Entire males > 2 tooth	
Fat cover	0 = 0 mm 1 = 0.1-0.9 mm 2 = 1.0-3.0 mm 3 = 3.1-5.0 mm 4 = 5.1-7.0 mm 5 = 7.1-10.0 mm 6 = >10.0 mm	1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat	1 = No fat 2 = Very lean 3 = Medium 4 = Fat 5 = Slightly over fat 6 = Over fat				

Classification criterion	Carcass classification classes			Live animal classification classes			
	Cattle	Goats	Sheep	Cattle	Goats	Sheep	
Carcass damage	0 = No damage 1 = Slight 2 = Moderate 3 = Severe	0 = No damage 1 = Slight 2 = Moderate 3 = Severe	0 = No damage 1 = Slight 2 = Moderate 3 = Severe				
Body condition				1 = very thin 2 = thin 3 = moderate 4 = fat 5 = overfat	1 = very thin 2 = thin 3 = moderate 4 = fat 5 = overfat	1 = very thin 2 = thin 3 = moderate 4 = fat 5 = overfat	

As mentioned previously, the aid of reference photographs will be necessary in visually assessed classification criteria. The classification system proposed for adoption already has these reference photographs except body condition scoring in live animals. The photographs in the existing regulations may however need to be reviewed and revised accordingly. Table 6.3 gives a template for body condition scoring of live cattle. Similar templates will need to be developed for body condition scoring of live goats and sheep.

Table 6.3: *Template for visual assessment: Body condition scoring of live cattle*

Body condition score	Description	Pictorial representation
1. Very thin	Backbone prominent Hips and shoulder bones prominent Ribs clearly visible Tail-head area recessed Skeletal body outline	
2. Thin	Backbone visible Hip and shoulder bones visible Ribs visible faintly Tail-head area slightly recessed Skeletal outline bony	
3. Moderate	Hip bones visible faintly Ribs generally not visible Tail-head area not recessed Body outline almost smooth	
4. Fat	Hip bones not visible Ribs well covered Tail-head area slightly lumpy Body outline rounded	
5. Over fat	Hip bones showing fat deposit Ribs very well covered Tail-head area very lumpy Body outline bulging due to fat	

6.5 Developing marketing grades from the classification systems

As observed earlier in this report, carcass and live animal classification involve describing carcasses or live animals according to set criteria and categorising them into classes based on clearly defined quality attributes to ensure more consistent meat quality and consumer satisfaction. This means that carcasses or live animals of similar composition and quality are classified in the same category (e.g. for age, conformation,

or level of fatness) to reduce the variation between carcasses and ensure more consistent end products. Classification also leads to improved efficiency as livestock keepers have a financial incentive to improve production methods and produce the most desired carcasses by consumers and traders. It further allows for standardised description of live animals or carcasses, which facilitates price setting, marketing and trading without the buyers having to be physically present. Thus, classification on its own provides sufficient information for production and marketing decisions.

Carcass or live animal grading on the other hand involves combining classification classes and categorising the animals or carcasses into uniform groups of similar quality and characteristics for purposes of determining value and facilitating market transactions. Because grading is derived from classification, the benefits of grading are similar but not identical to those of classification. In classification the emphasis is to provide the meat industry and consumers with a choice of carcasses in terms of composition and physical attributes, with no indication of perceived meat quality. Conceptually, therefore, a carcass classification system is based on the principle that producers, retailers and consumers differ in terms of their perceptions and expectations of carcass and meat quality, and subsequent eating experience. It is therefore intended to allow for individual variation in choice of the perceived quality. In a carcass grading system, on the other hand, an indication of perceived meat quality is provided for the different grades. The challenge is that perceptions of meat quality often do vary between individuals and between consumer categories. For this reason, some countries in the SADC region and elsewhere in the world have increasingly considered to only classify carcasses without grading them. The second reason is that grouping carcass classes into grades somewhat negates the process of having classified them, and that classification alone can be better and more precise than grading in meeting the meat attributes preferred by different consumers. As has been shown in Section 4 of this report, grading generally increases variation between carcasses put in the same grade. Grading has also been the major source of discrimination against indigenous breeds.

It is therefore proposed that the harmonised regional classification system should not consider grading. Instead, individual member states should make their own decisions whether or not to develop marketing grades from the classification criteria and classes proposed in this document according to their specific marketing situations. Where establishment of marketing grades is preferred, it is important to ensure that live animal or carcass weight is not included in determining grade price.

7. STRATEGIES FOR FORMULATING A REGIONAL LIVE ANIMAL AND CARCASS CLASSIFICATION POLICY, ITS DOMESTICATION AND ADOPTION

It should be emphasised that all activities and processes in SADC which require a regional approach and policy and have legal implications require participation of all Member States to get their support and buy-in from the outset. This proposal is one of such processes. Therefore, the process leading to development of a regional policy on live animal and carcass classification systems, their domestication and adoption, will be expected to take the following steps.

1. SADC Secretariat and CCARDESA in partnership with AU-IBAR should share widely this report with as many stakeholders as possible within Member States and the region to stimulate discussion on the proposed live animal and carcass classification systems. This should include stakeholders in both the public and private sectors to make their inputs to the proposal.
2. Stakeholders in each Member State should hold a national workshop (possibly convened or facilitated by the national member of the SADC Livestock Technical Committee (LTC)) to discuss this report and put together their views and comments that will be shared at a regional stakeholder workshop.
3. Hold a regional stakeholder consultative workshop involving SADC Secretariat, CCARDESA and all Member States to discuss the report and make their inputs, and to seek agreement in principle on the proposed adoption of the classification system currently in use in Lesotho, Namibia and South Africa, with suggested modifications. The regional workshop should also inform subsequent processes and actions towards development of the regional live animal and carcass classification system.
4. Through SADC Secretariat, get the requisite legal permission, if any is required, from the Member State(s) that own the classification used in Lesotho, Namibia and South Africa, or has the copyrights, to use the classification system as a template for developing the regional classification system.
5. Engage a consultant or a team of national experts, or both consultant plus team, to draft a harmonised regional policy and strategy document for live animal and carcass classification system for beef cattle, goats and sheep.
6. Develop regional guidelines and regulations governing the classification of live animals and carcasses, incorporating the proposed modifications.
7. SADC Secretariat in consultation with CCARDESA and Member States to identify institution(s) in the region that will oversee and manage the harmonised classification system and monitor implementation and revisions.
8. SADC Secretariat in consultation with CCARDESA and legal and livestock experts from the Member States, review the draft guidelines and regulations and come up with approved final drafts.
9. Have all the relevant establishment documents signed by the required minimum number of Member States to come into force.

For a process of this nature, it is proposed that a stand-alone budget be drawn up and the requisite funding secured to ensure a timely and uninterrupted execution of the process activities. It is expected that, technically, CCARDESA will lead and coordinate the process.

Once the classification system has come into force, or even before that stage is reached, Member States should draw up and embark on their own processes for domesticating the system in their countries, including preparation of domestic guidelines and regulations that are aligned to the regional regulations. This will include conducting stakeholder awareness workshops and field demonstrations, adopt training materials developed at regional level to train classifiers and other value chain actors, conduct regional and national workshops to train classifiers and other stakeholders, then officially launch the classification system after a trial period of implementation of, say, six months.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

Classification and grading of livestock and carcasses are a critical activity in production and formal marketing systems. However, livestock markets within SADC Member States are largely informal and are used by few stakeholders in the value chains, such as large-scale commercial farmers, livestock traders and middlemen. Most producers and other stakeholders do not have much say on how the grading standards are applied in their countries and therefore, do not draw many benefits from them. The few formal classification and grading systems that have been developed are mainly intended for national markets. The countries in the region therefore fail to benefit adequately from regional trade in livestock and livestock products. The need to develop harmonised systems for classifying and grading live animals and carcasses is therefore apparent and has been recognised for some time in the SADC region. This was emphasised by all stakeholders consulted during this study. A regional live animal and carcass classification and grading system will provide opportunity for Member States to harmonise their standards and facilitate cross-border trade. It will also improve both local and regional communication between producers, traders and processors, and enhance the quality of live animals or animal products traded. This is expected to stimulate improved herd or flock management and facilitate the development of price setting mechanisms.

Member States in the region use different livestock classification and grading systems and methods to facilitate marketing of live animals and carcasses. Few countries have functional carcass grading systems to facilitate marketing beef cattle, even fewer grading systems are available to facilitate marketing of goats or sheep carcasses, while virtually no formal grading systems exist for marketing live goats and sheep. Many of these grading systems have become old. They have not been revised for several years. They also appear to discriminate against indigenous breeds because of their small size compared with exotic breeds. This discrimination is particularly serious in grading systems in which weight is included, either directly or indirectly, in determining grade price. The grading systems in current use therefore discourage commercial production of indigenous livestock breeds, yet because of superior adaptability, they are overall more productive than exotic breeds. Removal of this discrimination can be expected to result in more realistic market prices of indigenous breeds, which should encourage their commercial production. Given the numerical strength of indigenous cattle, goats and sheep in the region, their promotion and commercial utilisation can have a huge impact on the livestock sector. This calls for a major revision of the live animal and carcass grading systems and a paradigm shift in the way in which the region manages and utilises its livestock breed resources.

There is therefore a clear need to develop harmonised live animal and carcass classification systems that do not discriminate against certain breeds and that benefit all livestock farmers and Member States, considering the current situation in the region, as well as the technologies, skills and resources that are available and accessible to Member States.

8.2 Recommendations

Based on the findings, the study makes the following recommendations:

- The carcass classification system in current use in Lesotho, Namibia and South Africa be adopted with revisions indicated in this report, and to include live animal classification.
- This study recommends against live animal or carcass grading at regional level because classification alone should be adequate to provide the necessary information for decisions on production, marketing, trade and pricing. However, individual member states should be free to decide whether to grade live animals or carcasses after classification.
- Strategies for developing a regional live animal and carcass classification policy and regulations, and for the domestication and adoption of the harmonised classification systems, should be designed and implemented in accordance with the usual SADC procedures and protocols for developing regional programmes and institutions.
- Once the classification system has come into force, or even before that stage is reached, member states should draw up and embark on their own processes for domesticating the system in their countries, including preparation of domestic regulations that are aligned to the regional regulations. This will include conducting stakeholder awareness workshops and field demonstrations, adopt training materials developed at regional level to train classifiers and other value chain actors, conduct regional and national workshops to train classifiers and other stakeholders, then officially launch the classification system after a trial period of implementation of, say, six months.
- The proposed regional live animal and carcass classification system should be considered as a living system and an important starting point. There will be need for refinement of the system as new information and technologies become available. The classification system should be improved based on scientific evidence. The following aspects are considered important in the improvement process:
    - The classification system should try to reduce the use of subjective assessments of the carcass quality criteria by introducing new and more reliable technologies, such as Visual Image Analysis (VIA) when it becomes affordable.
    - There is need to evaluate both pre- and post-slaughter handling procedures especially in indigenous livestock that can influence meat quality beyond the current focus on age and fat content.
    - Indigenous breeds usually have leaner and smaller carcasses, therefore post-slaughter procedures and chilling processes may be different from those currently designed for larger exotic animals. This should be investigated and taken into account as necessary in future revisions to the carcass classification systems
    - Ideally, carcass classification should include measurement of meat quality, such as tenderness and juiciness, but currently, no mechanisms are available for their measurement. Research will be necessary to develop techniques for measuring them readily as part of carcass classification. Knowledge of consumer preferences will also be an important consideration in this regard.

Therefore, substantial research will be necessary, together with regular reviews of the classification system, allowing improvements and new technologies to be incorporated into the classification system. There will be a need to ensure that no breeds are discriminated against, and biases need to be removed along the value chains, so that no stakeholder group benefits unduly against another group.

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10. ANNEXES

Annex 1: Terms of Reference

SHORT TERM CONSULTANCY

Development of a meat and live animal classification and grading system in the SADC region

LIVE2AFRICA PROJECT

Background

The African Union Interafrican Bureau for Animal Resources (AU-IBAR) is a specialized technical Office of the Department of Rural Economy and Agriculture (DREA) of the African Union Commission (AUC). AU-IBAR's mandate is to support and coordinate the utilization of livestock, fisheries and wildlife as a resource for both human wellbeing and economic development in the Member States of the African Union (AU). The mission of AU-IBAR is to provide leadership in the development of animal resources in Africa through supporting and empowering AU Member States and Regional Economic Communities (RECs).

AU-IBAR recognizes the adoption of a 10-year Science, Technology and Innovation Strategy for Africa (STISA-2024) by the African Union Heads of State and Government Summit. It further recognizes the continent's transformation agenda which re-affirms the impact envisioned through the Livestock development strategy for Africa (LiDeSA) and Agenda 2063. Therefore as part of providing leadership and coordination in the sustainable development of the continent, AU-IBAR is implementing a 5-year project on "Sustainable Development of Livestock for Livelihoods in Africa - Live2Africa". The project pioneers a coherent continental programme approach to build systemic capacity in seven livestock components, that include: Investment in Value Chains, Animal Health; Animal Production, Productivity and Ecosystem Management; Resilience Building; Technology adoption in the Value Chains to inputs, services and markets; and strengthening institutional capacities.

The overall objective of the project is "To support transformation of the African livestock sector for enhanced contribution to environmentally sustainable, climate resilient, socio-economic development and equitable growth" while the specific objective is to strengthen the systemic capacity of continental, regional and national Livestock Sector stakeholders for the economically, environmentally and socially sustainable transformation of the livestock sector.

Each of the five regions in Africa has prioritized a specific value chain(s) (Regional Livestock Value Chains – RLVC) and strategic actions to be taken in order to develop that value chain. Southern Africa Region chose the development of the Regional Red Meat (Beef and small ruminants) Value Chain.

Rationale

The issue of grading of live animals as well as carcasses in Southern Africa, has long been a contentious topic, mainly because of the grading systems appear to favour large-framed breeds which are predominantly the exotic breeds (Chingala et al. 2017). Some of the carcass grading systems, for example, in Zimbabwe, use carcass length as one of the key measurements for yield of the carcass. Most of the indigenous Southern

African breeds are small-framed and therefore cannot compete favorably in terms of size with the large-framed exotic breeds. Most indigenous breeds would have a fleshing index (ratio of carcass weight and carcass length, Wiyatna, 2007) which is inferior to those of carcasses of exotic breeds of similar age. There are other carcass characteristics which are taken into consideration in carcass grading systems. These include: age, carcass weight, meat to bone ratio, fat cover, marbling, carcass percentage, back fat thickness, eye muscle (musculus longissimus dorsi) area (also known as rib eye area, taken between the 12th and 13th rib), and conformation, among others. Most of these characteristics affecting the quality and carcass yield of the meat clearly prejudice indigenous breeds which are generally smaller than exotic breeds. The existing grading systems for carcasses, use carcass yield and quality attributes, but do not predict or classify eating quality at consumer level (Chingala et al 2017). Therefore, these grading system does not appear to consider the eating quality of the meat from different types of animals as an important characteristic. Yet it is commonly accepted that some consumers prefer meat and other products from indigenous breeds which they consider to have better eating qualities and taste than those of exotic breeds. Admittedly, taste is a subjective parameter, but as a consumer preference, it is highly significant as it can determine whether meat and products are marketable.

Most animals from the smallholder sectors in Southern Africa are marketed live (on the hoof), mainly in informal and occasionally in formal live markets. However, even in these markets, physical characteristics e.g. size and live weight (where it can be measured) of the animals, play significant roles in determining the market value of these animals. This inadvertently discriminates against the predominantly small-framed indigenous breeds.

It is therefore, clear that the Southern African region requires grading and classification systems for both live or slaughter animals, which do not discriminate against the small-framed indigenous breeds. The systems should be tailored to take into cognizance other important characteristics and qualities of indigenous breeds which are largely ignored or neglected in the existing grading and classification systems. Size and body measurements, though important, should not be the predominant features determining the grading or classification of live and slaughter animals.

As part of the development of the Red Meat and live animals RLVC for Southern Africa, AU-IBAR in collaboration with the Southern African Development Community (SADC) conducted a consultative stakeholder meeting in Victoria, Seychelles from 9th to 11th of March 2020 with the main objective to refine the implementation modalities of catalytic actions for the prioritized RLVC. One of the specific objectives of the meeting was to develop a Concept Note (CN). An intervention area in the CN "Develop mechanisms to enhance market access at local, regional and international levels" has an activity "Review and adapt existing grading systems to accommodate indigenous animal genetic resources".

Therefore, AU-IBAR, working in collaboration with SADC, would like to engage the services of a highly qualified and experienced consultant to propose and develop a classification and grading system for live and slaughter animals in the SADC region along the Red meat and live animal value chain.

Objective of the consultancy

Under the Live2Africa Project Result Area 1 (Investment in Livestock Value Chains (LVCs) increased) the overarching goal is to develop mechanisms to enhance market access at local, regional and international levels. Improved market access can be achieved if farmers receive fair prices determined by objective grading of their goods and products.

The main objective of this consultancy is therefore, to develop grading and classification systems for both carcass and live animals of cattle, sheep and goats with particular emphasis on indigenous breeds in Southern Africa.

The specific objectives of the consultancy are:

- To compile existing classification and grading systems for live and slaughter cattle, sheep and goats in Southern Africa.
- To critically analyze and synthesize the existing classification and grading systems for live and slaughter cattle, sheep and goats in Southern Africa
- To propose and develop classification and grading systems for live and slaughter cattle, sheep and goats in Southern Africa

Expected output of the consultancy

- State of knowledge on classification and grading of carcass and live animals (cattle, sheep and goats) available
- A critical representation of instruments for classification and grading systems for live and slaughter cattle, sheep and goats in the region, available
- Classification and grading systems for live and slaughter cattle, sheep and goats for the Southern African region, developed and available

Methodology

The process of the executing the assignment will be guided by the SADC consultative process of developing policy and legal instruments. In brief, this will involve national and regional reviews and consultations, interviews and validation workshop. The report will have a vision and a mission to guide the regional and national strategic aspirations for livestock development in the region as embraced by the SADC Regional Agricultural Policy, Livestock Development Strategy and the Regional Animal Genetic Resources Strategy as well as the Regional Industrialization Strategy and Road Map among others.

In summary, the consultant is expected to use a variety of approaches including but not limited to:

i. Desktop studies for review, collation and analysis of national policies, strategies, laws and regulation amongst other policy instruments with a direct bearing on the development of the red meat and live animal value chain in the target countries and the region
ii. In depth interviews with stakeholders from public and private sectors in selected representative SADC Member States
iii. Facilitate validation meeting(s) (physical and/or electronic) to present the draft regional report.
iv. Consolidate feedback and update the regional report based on input from the validation meeting(s).

Inception Report (IcTR)

- An Inception Report (IcTR) should be submitted within 2 weeks of commencing the assignment. The IcTR of not more than 10 pages, should include the proposed methodology, the timeline/calendar and programme of activities and an outline of the contents of the Final Technical Report.

Progress Reports

- An update on progress should be reported bi-weekly to AU-IBAR, SADC and CCARDESA technical staff.

Interim Technical Report (InTR)

The Interim Technical Report is perceived to be the First Draft of the Final Technical Report (FTR). The InTR should be submitted to AU-IBAR, SADC and CCARDESA after 30 working days of the assignment.

Final Technical Report (FTR)

- The Final Technical Report (FTR) should take into account contributions and comments from the relevant stakeholders, including AU-IBAR, SADC and CCARDESA. The FTR must be submitted at the end of the period of implementation of the tasks.

Time Frame

The assignment will be conducted for a period of 50 (fifty) working days spread over 90 days including collection of secondary data and information, consultations, field visits (if feasible), presentation of the findings and submission of the final report. The final report should be submitted within 14 calendar days of the receipt of final comments on the draft.

The assignment will start immediately after signature of the contract by both parties.

Technical and Financial Proposals

Applicants should submit a Technical Proposal that should include:

- Outline of the methodology, for conducting the consultancy as per the tasks and indicate the number of days to accomplish each task.
- Profile and CVs of the consultant undertaking the work indicating relevant academic qualifications and professional experience
- Information showing past experience in related fields, demonstrating an inventory of past and current assignments of similar nature.
- Contact addresses (Postal, email and telephone) of at least three referees or any other information that may show the consultant's ability to carry out the assignment to satisfaction.

Financial Proposal

This consultancy has a maximum budget allocation of USD 15,000.00. Therefore, the Financial Proposal should not exceed this amount.

The Financial Proposal should cover consultancy fees for the conduct of the assignment from the beginning (day of signature by both parties) to the end of the consultancy (when Final Technical Report is submitted),

bearing in mind that the assignment is for a total period of 50 working days. There will be no other consultancy fees paid outside this period.

Management Arrangements

Location of assignment

The assignment will be carried out in the SADC region from the consultant's base. There will be a possibility of travel to selected countries in the SADC region subject to necessity and the lifting of travel restrictions due to the COVID-19 pandemic. Any necessary and feasible field visits will be carried out in after agreement with AU-IBAR, SADC and CCARDESA. AU-IBAR will cover the costs of field visits (DSA, airticket, travel, etc.) according to AUC Rules and Regulations.

Qualifications

The assignment is open to experienced experts with over 15 years' experience in Livestock Value Chains in the SADC region. A Masters' degree qualification in animal science, natural sciences, or related subjects is the minimum required for this assignment. A PhD is an added advantage.

A good command of both spoken and written English is essential. Knowledge of other AU languages (French, Portuguese and Arabic) will be an added advantage.

Competencies

Professionalism – good understanding and knowledge of animal resources development, agricultural economics, communication, advocacy or other relevant disciplines.

Planning and Organizing – Ability to plan own work and manage conflicting priorities. Demonstrate effective organizational skills and ability to handle work in an efficient and timely manner.

Writing and Communication – excellent writing skills; ability to write in a clear and concise manner and to communicate messages effectively

Evaluation Criteria

Technical Scoring

The evaluation of the Technical Proposal will weigh 70% of the total rating and will be evaluated against the following criteria

i. At least 15 years' working experience in livestock development specific to the Southern
ii. African Development Community (SADC) Member States
iii. Proficiency in the red meat and live animals livestock value chains
iv. Proficiency in classification and grading systems in the red meat and live animal value chain
v. Familiarity of national or regional policies, strategies, laws and regulations on classification and grading systems for lives and slaughter cattle, sheep and goats in Southern Africa
vi. Record of successful accomplishments of similar tasks conducted
vii. Evidence of excellent writing and communication skills
viii. Proficiency in spoken and written English language

ix. Evidence of experience in stakeholder consultations and engagement
x. Adequacy of the proposal, work plan and approach

The consultant must fulfil the above mandatory requirements and score at least 70/100 in order to be considered for further evaluation.

Financial Evaluation

The evaluation of the financial proposal will weigh 30% of the total rating. The financial proposal will be evaluated on the basis of total cost, cost realism and used in combination with the assessment of the technical quality to determine the best value for money.

Status and responsibilities of the consultant

By this contract, as a consultant, you are not engaged as an employee of AU-IBAR and therefore you are entirely responsible for your own medical and life insurances. There shall be no other entitlements.

You shall exercise a high degree of skill and care in the provision of the CONSULTANCY services and will devote as much of your time to the services as may be necessary to enable them to be carried out efficiently.

Your relationship with AU-IBAR shall be that of an independent consultant. You will have no authority to incur any liability or make any commitment on behalf of AU-IBAR, nor will you hold yourself out as being an employee of AU-IBAR.

As an independent consultant, you will be solely responsible for any tax, national insurance contributions and any other similar payments and will keep AU-IBAR indemnified against any claims or costs in relation to those matters.

Ownership of information and confidentiality

Any information arising out of this work is the property of AU-IBAR and should be available on request. You, as a consultant should obtain a written agreement from AU-IBAR before divulging information relating to the study to any third party.

Supervision and Coordination

The consultant will work closely with the Live2Africa Technology, Innovations and Skill Development Expert and the SADC and CCARDESA focal persons.

How to Apply

Please submit your CV including three references and a proposal latest 28th September 2020 to the Director of AU-IBAR, Kenindia Business Park, Museum Hill, Westlands Road, PO Box 3078600100 Nairobi, Kenya or email at procurement@au-ibar.org clearly indicating in the subject line consultancy to "Development of a meat and live animal classification and grading system in the SADC region" Only short-listed candidates will be notified.

QUESTIONNAIRE FOR ASSESSMENT OF CARCASS CLASSIFICATION AND GRADING SYSTEMS FOR BEEF CATTLE, GOATS AND SHEEP IN THE SADC REGION

Note on Carcass classification versus Grading

In this Questionnaire, we have defined classification of carcasses differently from grading. Classification describes the carcass according to specific classification criteria (e.g. Age, Sex, Fatness, etc) and classification classes within a criterion (e.g. 0, 2, 4, permanent incisor teeth, , etc within the Age classification criterion).

On the other hand, grading involves grouping the classification classes into grades. Kindly take note of this clarification when responding to the questions. Please answer all the questions to the best of your ability.

1. Email address *

.....

Section A: Biodata of respondents

This section is for some information about the respondent and will remain confidential. Kindly note that the information will not be used for any purposes without the express consent of the respondent

2. Country *

.....

3. Name of Respondent *

.....

4. Age group *

Check all that apply.

◯ <30

◯ 30 - 50

◯ >50

5. Designation / Position *

.....

6. Which organization do you represent (institution, farm, etc.?) *

7. In the red meat and live animal value chain, what best describes your main involvement/role/type of activity? *

Mark only one oval.

Production

Inputs and Services (Animal Health)

Inputs and services (Technologies, Transportation, Finance and Credit Services, Animal Feeds, etc)
Value addition and processing

Trade and Marketing

Regulation, legislation , Co-ordination and Harmonization

Other:.....

8. Indicate the PRIORITY livestock species that you are actively involved in classifying or grading *

Mark only one oval.

Cattle

Goats

Sheep

Section B: BEEF CATTLE

1. Do you know the current beef carcass classification and grading schemes used in your country? *

Mark only one oval.

Yes

No

2. Who are the primary users of these classification and grading systems? *

Check all that apply.

Cattle Producers Middle men

Marketers (butcheries, abattoirs, others) Consumers

Processors Other (specify)

If indicated Other above, kindly specify

Please tick the criteria used for classifying beef carcasses in your country *

Check all that apply.

⬭ Age (measured as number of permanent incisor teeth or other estimation system) Sex of animal

⬭ Carcass fat

⬭ Visual conformation/assessment Carcass damage

⬭ Carcass size/weight Fleshing index Other (specify)

If indicated Other above, kindly specify

.....

4. Specify the age classes used *

Check all that apply.

⬭ 0 permanent Incisor teeth 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth 7-8 permanent Incisor teeth

⬭ Other:.....

5. Specify the sex classes used *

Check all that apply.

⬭ Mature bulls

⬭ Steers

⬭ Cows

⬭ Heifers

⬭ Calves

⬭ Young bulls

⬭ Other:.....

6. Specify the Carcass fat classes used *

.....

7. Specify the Visual conformation/assessment classes used *

.....

8. Specify the carcass damage classes used *

.....

9. Specify the Carcass weight/size classes used *

.....

10. Specify the fleshing index classes used *

.....

11. Other (specify) *

.....

12. Does your country use the carcass classification classes in carcass grading? *

Mark only one oval.

◯ Yes

◯ No

◯ Not aware

13. Please LIST and DESCRIBE the carcass grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the beef carcass classification classes that make up the grade *

.....

.....

15 Are there challenges in the classification of beef cattle carcasses? *

Mark only one oval.

◯ Yes

◯ No

16. If Yes, please list the key challenges? *

.....

.....

17. In your opinion, how can these challenges be addressed? *

.....

.....

18. Have you received any formal training on classification and grading of beef carcasses? *

Mark only one oval.

◯ Yes

◯ No

19. If Yes, what was the training on and who provided the training? *

.....

20. In your opinion, does the system for classification of beef cattle carcasses in your country discriminate against indigenous breeds? *

Mark only one oval.

◯ Yes

◯ No

21. If Yes, please describe how the classification system discriminates against carcasses of indigenous cattle. *

.....

.....

22. Are there any strengths of indigenous beef cattle that are not considered in the current carcass classification and grading system? *

Mark only one oval.

◯ Yes

◯ No

23. If the answer is Yes, list TWO key strengths of indigenous cattle that are not considered in the current carcass classification and grading system? *

24. What are the current benefits of using the beef carcass classification and grading system? *

.....

.....

25a. List three technical interventions aimed at improving the existing carcass classification and grading systems in use *

.....

.....

25b. List three recommendations to strengthen capacity building to improve the existing carcass classification and grading systems in use *

.....

.....

25c. List three recommendations to strengthen governance to improve the existing carcass classification and grading systems in use *

.....

.....

26. Do you think there will be any benefits of developing a single harmonized system of classifying and grading beef carcasses for the SADC region? *

Mark only one oval.

◯ Yes

◯ No

27. Briefly explain your answer? *

.....

.....

28. List THREE approaches that can be used to support the development and adoption of a harmonized classification and grading system for cattle carcasses in the SADC region. *

.....

.....

Section C: GOATS

1. Do you know the current goat carcass classification and grading schemes used in your country? *

Mark only one oval.

⬭ Yes

⬭ No

2. Who are the primary users of these classification and grading systems?

Check all that apply.

⬭ Goat Producers

⬭ Middlemen

⬭ Marketers (butcheries, abattoirs, others) Consumers

⬭ Processors

⬭ Other (specify)

.....

3. Please tick the criteria used for classifying goat carcasses in your country *

Check all that apply.

⬭ Age (measured as number of permanent incisor teeth or other estimation system)

⬭ Sex of animal

⬭ Carcass fat

⬭ Visual conformation/assessment

⬭ Carcass damage

⬭ Carcass size/weight Fleshing index

⬭ Other (specify)

.....

4. Specify the age classes used *

Check all that apply.

⬭ 0 permanent Incisor teeth

⬭ 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth

⬭ 7-8 permanent Incisor teeth

5. Specify the sex classes used *

Check all that apply.

⬭ Buck

⬭ Castrate

⬭ Maiden doe

⬭ Doe

⬭ Other:.....

6. Specify the Carcass fat classes used *

.....

7. Specify the Visual conformation/assessment classes used *

.....

8. Specify the carcass damage classes used *

.....

9. Specify the Carcass weight/size classes used *

.....

10. Specify the fleshing index classes used *

.....

11. Other (specify) *

.....

12. Does your country use the carcass classification classes in carcass grading? *

Mark only one oval.

Yes

No

Not aware

13. Please LIST and DESCRIBE the carcass grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the goat carcass classification classes that make up the grade *

.....

.....

15 Are there challenges in the classification of goat carcasses? *

Mark only one oval.

Yes

No

16. If Yes, please list the key challenges? *

.....

.....

17. In your opinion, how can these challenges be addressed? *

.....

.....

18. Have you received any formal training on classification and grading of goat carcasses? *

Mark only one oval.

Yes

No

19. If Yes, what was the training on and who provided the training? *

.....

.....

20. In your opinion, does the system for classification of goat carcasses in your country discriminate against indigenous breeds? *

Mark only one oval.

◯ Yes

◯ No

21. If Yes, please describe how the classification system discriminates against carcasses of indigenous goats. *

.....

.....

22. Are there any strengths of indigenous goats that are not considered in the current carcass classification and grading system? *

Mark only one oval.

◯ Yes

◯ No

23. If the answer is Yes, list TWO key strengths of indigenous goats that are not considered in the current carcass classification and grading system? *

.....

.....

24. What are the current benefits of using the goats carcass classification and grading system? *

.....

.....

25a. List three technical interventions aimed at improving the existing carcass classification and grading systems in use *

.....

.....

25b. List three recommendations to strengthen capacity building to improve the existing carcass classification and grading systems in use *

.....

.....

25c. List three recommendations to strengthen governance to improve the existing carcass classification and grading systems in use *

.....

.....

26. Do you think there will be any benefits of developing a single harmonized system of classifying and grading goat carcasses for the SADC region? *

Mark only one oval.

◯ Yes

◯ No

27. Briefly explain your answer? *

.....

.....

28. List THREE approaches that can be used to support the development and adoption of a harmonized classification and grading system for goat carcasses in the SADC region. *

.....

.....

Section D: SHEEP

1. Do you know the current sheep carcass classification and grading schemes used in your country? *

Mark only one oval.

◯ Yes

◯ No

2. Who are the primary users of these classification and grading systems?

Check all that apply.

◯ Sheep

◯ Producers

◯ Middle men

◯ Marketers (butcheries, abattoirs, others) Consumers

⬭ Processors Other (specify)

.....

3. Please tick the criteria used for classifying sheep carcasses in your country *

Check all that apply.

⬭ Age (measured as number of permanent incisor teeth or other estimation system)

⬭ Sex of animal

⬭ Carcass fat

⬭ Visual conformation/assessment

⬭ Carcass damage

⬭ Carcass size/weight

⬭ Fleshing index Other (specify)

.....

4. Specify the age classes used *

Check all that apply.

⬭ 0 permanent Incisor teeth

⬭ 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth

⬭ 7-8 permanent Incisor teeth

⬭ Other:.....

5. Specify the sex classes used *

Check all that apply.

⬭ Ram Castrate

⬭ Maiden ewe

⬭ Ewe

◯ Other:

.....

6. Specify the Carcass fat classes used *

.....

7. Specify the Visual conformation/assessment classes used *

.....

8. Specify the carcass damage classes used *

.....

9. Specify the Carcass weight/size classes used *

.....

10. Specify the fleshing index classes used *

.....

11. Other (specify) *

.....

12. Does your country use the carcass classification classes in carcass grading? *

Mark only one oval.

◯ Yes

◯ No

◯ Not aware

13. Please LIST and DESCRIBE the carcass grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the sheep carcass classification classes that make up the grade *

.....

.....

15. Are there challenges in the classification of sheep carcasses? *

Mark only one oval.

◯ Yes

No

16. If Yes, please list the key challenges? *

.....

.....

17. In your opinion, how can these challenges be addressed? *

.....

.....

18. Have you received any formal training on classification and grading of sheep carcasses? *

Mark only one oval.

Yes

No

19. If Yes, what was the training on and who provided the training? *

.....

.....

20. In your opinion, does the system for classification of sheep carcasses in your country discriminate against indigenous breeds? *

Mark only one oval.

Yes

No

Don't know

21. If Yes, please describe how the classification system discriminates against carcasses of indigenous sheep. *

.....

.....

22. Are there any strengths of indigenous sheep that are not considered in the current carcass classification and grading system? *

Mark only one oval.

Yes

◯ No

◯ Don't know

23. If the answer is Yes, list TWO key strengths of indigenous sheep that are not considered in the current carcass classification and grading system? *

.....

.....

24. What are the current benefits of using the sheep carcass classification and grading system? *

.....

.....

25a. List three technical interventions aimed at improving the existing carcass classification and grading systems in use *

.....

.....

25b. List three recommendations to strengthen capacity building to improve the existing carcass classification and grading systems in use *

.....

.....

25c. List three recommendations to strengthen governance to improve the existing carcass classification and grading systems in use *

.....

.....

26. Do you think there will be any benefits of developing a single harmonized system of classifying and grading sheep carcasses for the SADC region? *

Mark only one oval.

◯ Yes

◯ No

◯ Not sure

27. Briefly explain your answer? *

.....

.....

28. List THREE approaches that can be used to support the development and adoption of a harmonized classification and grading system for sheep carcasses in the SADC region. *

.....

.....

Appreciation

Thank you for taking time to respond to the above questions. We value your feedback and we will keep you updated on the consolidated findings. We commit to treat all information that has been provided with the utmost confidentiality.

QUESTIONNAIRE FOR ASSESSMENT OF LIVE ANIMAL CLASSIFICATION AND GRADING SYSTEMS FOR BEEF CATTLE, GOATS AND SHEEP IN THE SADC REGION

Note on live animal classification versus grading

In this Questionnaire, we have defined classification of live animals differently from grading. Classification describes the live animals according to specific classification criteria (e.g. Age, Sex, Fatness, Conformation, etc) and classification classes within a criterion (e.g. 0, 2, 4, permanent incisor teeth, etc within the Age classification criterion). On the other hand, grading involves grouping the classification classes into grades. Kindly take note of this clarification when responding to the questions. Please answer all the questions to the best of your ability.

* *Required*

Email address *

.....

SECTION A: Biodata of respondents

Name of Respondent *

.....

Country *

.....

Age group *

Mark only one oval.

◯ <30

◯ 30 - 50

◯ >50

Designation / Position *

.....

Which organization do you represent (institution, farm, etc.?) *

In the red meat and live animal value chain, what best describes your main involvement/role/type of activity? *

Mark only one oval.

◯ Production

Inputs and services (Animal Health)

Inputs and services (Technologies, Transportation, Finance and Credit Services, Animal Feeds, etc)

Value addition and processing

Trade and Marketing

Regulation, legislation, Co-ordination and Harmonization

Other:.....

Indicate the PRIORITY livestock species that you are actively involved in classifying or grading *

Mark only one oval.

Cattle Skip to question 9

Goats Skip to question 40

Sheep Skip to question 71

Section B: BEEF CATTLE

1. Is there a system of classifying and/or grading of live cattle in your country? *

Mark only one oval.

Yes

No

Don't know

2. If not, do you think such a system will be necessary?

Mark only one oval.

Yes

No

Maybe

3. Please explain your answer to the previous question

4. Who are the primary users of these classification systems?

Check all that apply.

⬭ Cattle producers

⬭ Middle men

⬭ Marketers (butcheries, abattoirs, others)

⬭ Consumers

⬭ Processors

⬭ Other:.....

5. Please tick the criteria used for classifying live cattle in your country

Check all that apply.

⬭ Age

⬭ Sex of Animal

⬭ Body condition

⬭ Conformation Weight

⬭ Other:.....

6. Specify the age classes used

Check all that apply.

⬭ 0 permanent incisor teeth

⬭ 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth

⬭ 7-8 permanent Incisor teeth

⬭ Other:.....

If indicated Other above specify

7. Specify the sex classes used *

Check all that apply.

- ⬭ Young bulls
- ⬭ Mature bulls
- ⬭ Steers
- ⬭ Cows
- ⬭ Heifers
- ⬭ Other:.....

If indicated other above

Mark only one oval.

- ⬭ Option 1

8. Specify the body condition classes used *

.....

.....

9. Specify the body conformation classes used *

.....

.....

10. Specify the live weight/size classes used *

.....

.....

11. Other

.....

.....

12. Is the live cattle classification used in grading? *

Mark only one oval.

- ⬭ Yes

No

Not sure

13. If Yes, please LIST and DESCRIBE the live cattle grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the live cattle classification classes that make up the grade *

.....

.....

15. Are there challenges in the classification of live cattle? *

Mark only one oval.

Yes

No

Not sure

16. If Yes, please list the key challenges? *

.....

.....

17. In your opinion how can these challenges be addressed?

.....

.....

18. Have you received any formal training on classification and grading of live cattle? *

Mark only one oval.

Yes

No

19. If Yes, what was the main topic and who provided the training?

.....

.....

20. In your opinion, does the system for classification or grading of live cattle in your country discriminate against indigenous breeds? *

Mark only one oval.

◯ Yes

◯ No

◯ Slightly

◯ Don't know

21. If Yes, please briefly describe how the classification or grading system for live cattle discriminates against indigenous breeds. *

.....

.....

22. If Yes, list TWO key strengths of indigenous cattle that are not considered in the current live animal classification and grading system? *

.....

.....

23. What are the current benefits of using live cattle classification and grading system? *

.....

.....

24a. List three technical interventions aimed at improving the existing live animals classification and grading systems in use. *

.....

.....

24b. List three recommendations to strengthen capacity building to improve the existing live animals classification and grading systems in use *

.....

.....

24c. List three recommendations to strengthen governance to improve the existing live animals classification and grading systems in use *

.....

.....

25. In your opinion, are there any benefits of developing a single harmonized system of classifying live cattle for the SADC region? *

Mark only one oval.

Yes

No

Not sure

26. Briefly explain your answer? *

.....

.....

27. If Yes, list TWO approaches that can be used to support the development and adoption of a harmonized classification and grading systems for live cattle. *

.....

.....

Skip to section 6 (APPRECIATION)

Section C: GOATS

1. Is there a system of classifying and/or grading of live goats in your country? *

Mark only one oval.

Yes

No

Not aware

2. In your opinion, is such a classification and/or grading system considered necessary? *

Mark only one oval.

Yes

No

3. Please explain your answer to the previous question? *

.....

.....

4. Who are the primary users of these classification systems?

Check all that apply.

⬭ Goat Producers Middle men

⬭ Marketers (butcheries, abattoirs, others)

⬭ Consumers

⬭ Processors

⬭ Other:.....

5. If you have an existing classification and grading criteria, Please tick the most common classifying criteria used in your country. *

Check all that apply.

⬭ Age

⬭ Sex of Animal

⬭ Body condition

⬭ Conformation Weight

⬭ Other:.....

6. Specify the age classes used *

Check all that apply.

⬭ 0 permanent Incisor teeth

⬭ 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth

⬭ 7-8 permanent Incisor teeth

⬭ Other:.....

If indicated other above, specify

.....

.....

7. Specify the sex classes, as defined in your live goats classification or grading system *

Check all that apply.

⬭ Bucks

⬭ Castrate

⬭ Maiden doe

⬭ Doe

⬭ Other:.....

If indicated other above, specify

.....

.....

8. Specify the body condition classes used *

.....

.....

9. Specify the body conformation classes used *

.....

.....

10. Specify the live weight/size classes used *

.....

.....

11. Other

.....

.....

12. Does your country use live animal classification classes into grades? *

Mark only one oval.

⬭ Yes

⬭ No

⬭ Not aware

13. Please LIST and DESCRIBE the grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the live animal classification classes that make up the grade *

.....

.....

15. Are there challenges in the classification of live goats? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not sure

16. If Yes, please list the key challenges?

.....

.....

17. In your opinion how can these challenges be addressed?

.....

.....

18. Have you received any formal training on classification and grading of live goats? *

Mark only one oval.

- ◯ Yes
- ◯ No

19. If Yes, what was the main topic and who provided the training?

20. In your opinion, does the system for classification or grading of live goats in your country discriminate against indigenous breeds? *

Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Slightly
- ◯ Don't know

21. If Yes, please briefly describe how the classification or grading system for live goats discriminates against indigenous breeds. *

.....

.....

22. If Yes, list TWO key strengths of indigenous goats that are not considered in the current live animal classification and grading system? *

.....

.....

23. What are the current benefits of using live goats classification and grading system? *

.....

.....

24a. List three recommendations to strengthen technical content aimed at improving the existing classification and grading systems in use. *

.....

.....

24b. List three recommendations to strengthen capacity building to improve the existing classification and grading systems in use *

.....

.....

24c. List three recommendations to strengthen governance to improve the existing classification and grading systems in use *

.....

.....

25. In your opinion, are there any benefits of developing a single harmonized system of classifying live goats for the SADC region? *

Mark only one oval.

◯ Yes

◯ No

◯ Not sure

26. Please explain your answer? *

.....

.....

27. If Yes, list TWO approaches that can be used to support the development and adoption of a harmonized classification and grading systems for live goats. *

.....

.....

Skip to section 6 (APPRECIATION)

Section D: SHEEP

1. Is there a system of classifying and/or grading of live sheep in your country? *

Mark only one oval.

◯ Yes

◯ No

◯ Not aware

2. In your opinion, is such a classification and/or grading system considered necessary? *

Mark only one oval.

◯ Yes

◯ No

◯ Maybe

3. Please explain your answer to the previous question?

4. Who are the primary users of these classification systems *

Mark only one oval.

◯ Sheep producers

◯ Middle men

◯ Marketers (butcheries, abattoirs, others)

◯ Consumers

◯ Processors

⬭ Other:.....

5. If you have an existing classification and grading criteria, Please tick the most common classifying criteria used in your country. *

Check all that apply.

⬭ Age

⬭ Sex of Animal

⬭ Body condition

⬭ Conformation Weight

⬭ Other:.....

6. Specify the age classes used *

Check all that apply.

⬭ 0 permanent Incisor teeth

⬭ 3 permanent Incisor teeth

⬭ 4-6 permanent Incisor teeth

⬭ 7-8 permanent Incisor teeth

⬭ Other:.....

If indicated other above, specify

.....

.....

7. Specify the sex classes, as defined in your live goat classification or grading system *

Check all that apply.

⬭ Ram

⬭ Castrate

⬭ Maiden ewe

◯ Ewe

◯ Other:.....

If indicated other above, specify

.....

.....

8. Specify the body condition classes used *

.....

.....

9. Specify body conformation classes used *

.....

.....

10. Specify liveweight/size classes used *

.....

.....

11. Other

.....

.....

12. Does your country use live animal classification classes into grades? *

Mark only one oval.

◯ Yes

◯ No

◯ Not aware

13. Please LIST and DESCRIBE the grades from the highest to lowest grade *

.....

.....

14. For each grade, please list the live animal classification classes that make up the grade *

.....

.....

15. Are there challenges in the classification of live sheep? *

Mark only one oval.

Yes

No

Not sure

16. If Yes, please list the key challenges? *

.....

.....

17. In your opinion how can these challenges be addressed? *

.....

.....

18. Have you received any formal training on classification and grading of live sheep? *

Mark only one oval.

Yes

No

19. If Yes, what was the main topic and who provided the training?

.....

.....

20. In your opinion, does the system for classification or grading of live sheep in your country discriminate against indigenous breeds? *

Mark only one oval.

Yes

No

Slightly

Don't know

21. If Yes, please briefly describe how the classification or grading system for live sheep discriminates against indigenous breeds. *

.....

.....

22. If Yes, list TWO key strengths of indigenous sheep that are not considered in the current live animal classification and grading system? *

.....

.....

23. What are the current benefits of using live sheep classification and grading system? *

.....

.....

24a. List three technical interventions aimed at improving the existing classification and grading systems in use. *

.....

.....

24b. List three recommendations to strengthen capacity building to improve the existing classification and grading systems in use *

.....

.....

24c. List three recommendations to strengthen governance to improve the existing classification and grading systems in use *

.....

.....

25. In your opinion, are there any benefits of developing a single harmonized system of classifying live sheep for the SADC region? *

Mark only one oval.

◯ Yes

◯ No

◯ Not sure

26. Please explain your answer? *

.....

.....

27. If Yes, list TWO approaches that can be used to support the development and adoption of a harmonized classification and grading systems for live sheep. *

APPRECIATION

This content is neither created nor endorsed by Google.

Annex 3: List of people consulted

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