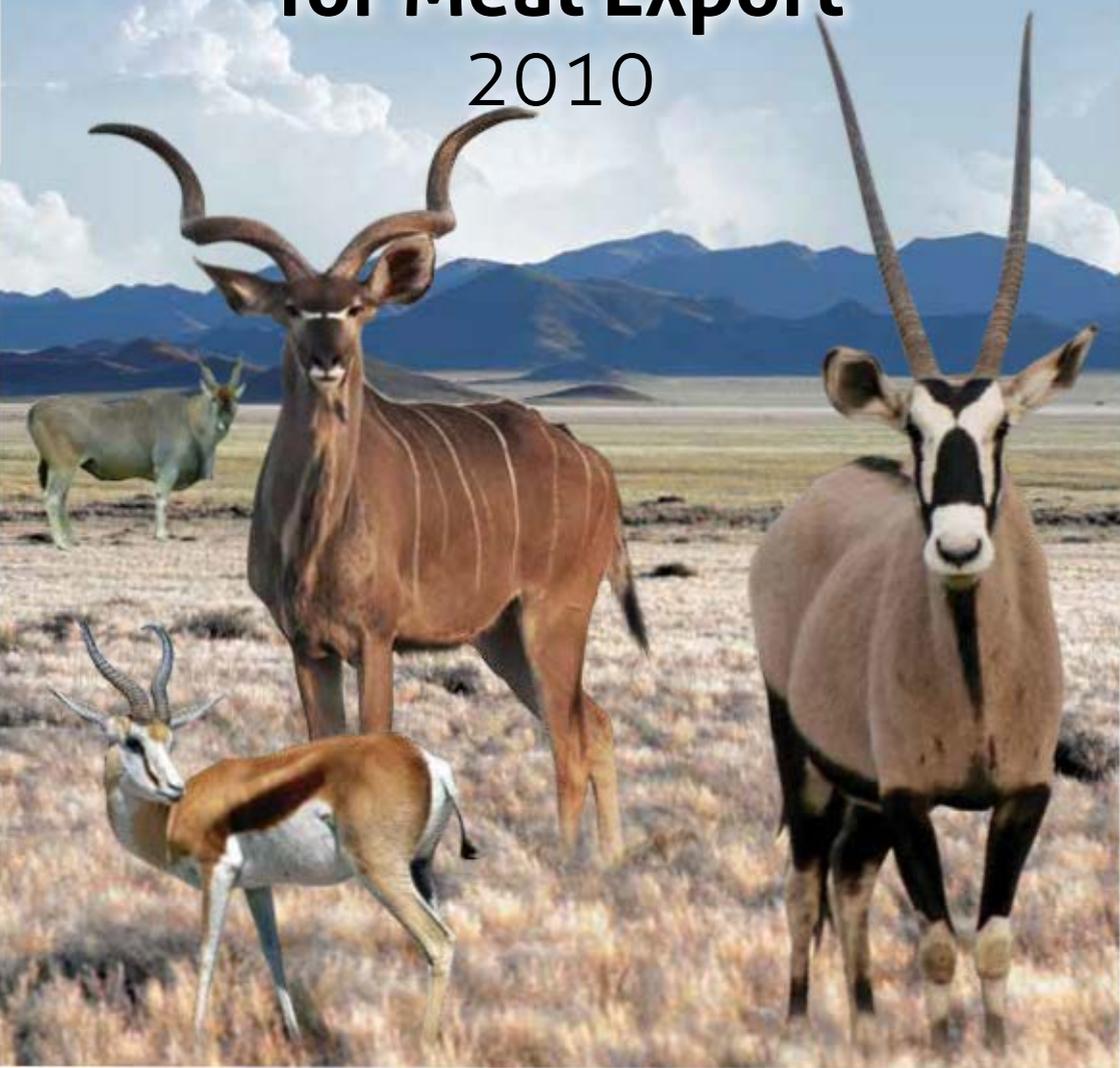


Guidelines for the Harvesting of Game for Meat Export 2010



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With special input from MY Hemberger and K Magwedere

ACKNOWLEDGEMENTS

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PREFACE

The wildlife industry in Namibia has shown tremendous growth over the past decades and is currently the only extensive animal production system that is expanding. Tourism, live sales and trophy hunting can, however, not alone sustain further growth. Harvesting wildlife for the purpose of meat production is a viable option since there is a worldwide demand for healthy and high-quality meat proteins. The need to hygienically harvest game spearheaded the writing of this guideline booklet for Namibian game harvesting teams. This booklet does however not replace any Act or Regulation with regard to the harvesting of game for meat export.



Ministry of Environment and Tourism
Ministry of Agriculture, Water and Forestry

FOREWORD

The wildlife sector in Namibia has a major role to play in achieving Namibia's Vision 2030. Output needs to increase many folds to make a significant contribution towards the growth of the economy and wealth creation.

There are strong indications that the under-utilized wildlife industry has huge potential for value addition and diversification of income opportunities for communal conservancies and commercial farmers in Namibia. Game numbers have increased significantly in Namibia over the last decades. The wildlife assets in Namibia are estimated to be worth N\$ 10.5 billion with wildlife numbers estimated at 2, 038 million. Namibia has a number of regulations that apply to the sustainable use of game animals which are applicable when the harvesting of game animals for commercial game meat production is used to remove excess animals. Countries importing game meat also lay down specific rules and regulations whereby countries willing to export game meat must abide.

Only harvesting teams registered with the Namibian Directorate of Veterinary Services and the Ministry of Environment and Tourism are allowed to harvest for the commercial export of game meat. There are however still needs, impediments and challenges to be addressed within the consumptive wildlife industry. A need was identified to condense and summarize the conceptual elements of standard operational procedures and basic food safety practices for game harvesting into a guideline booklet and to portray them in an easily understandable format for those in the Game Meat Export industry.

Investments in game harvesting and slaughtering for high value export markets are welcomed since it can open up new opportunities for the Namibian economy. The Ministry of Agriculture, Water and Forestry therefore supports the capacity building of game harvesters and thereby approves the use of this guideline booklet to improve knowledge and skills in this highly specialized field of game harvesting.

Signed



Mr Andrew Ndishishi

Permanent Secretary

Ministry of Agriculture Water and Forestry



Andrew Ndishishi

CONTENTS

CHAPTER 1

OVERVIEW OF THE NAMIBIAN GAME MEAT INDUSTRY

1.1	Commercial rights over wildlife	1
1.2	Wildlife populations	2
1.3	Different ways of marketing wildlife	3
1.4	Commercially harvestable game species	6
1.5	Ethical and sustainable harvesting	7
1.6	Eating qualities of meat	8
1.7	Game meat value chain	9
1.8	Contribution to sound rangeland and environmental management	9
1.9	Contribution to the national economy	10

CHAPTER 2

REGULATORY REQUIREMENTS, PREPARATIONS AND OTHER IMPORTANT PROCEDURES

2.1	Veterinary, Wildlife and Food Acts/Regulations	11
2.2	Registration of harvesting teams for commercial harvesting	13
2.3	Operation of harvesting teams in communal conservancies	15
2.4	Payment procedures	17
2.5	Medical check-ups for harvesters	17
2.6	HACCP plan and record keeping	18
2.7	Training of Game Meat Examiner	19
2.8	Checking of relevant documentation before harvesting	20

CHAPTER 3

SUSTAINABLE HARVESTING OF GAME

3.1	Growth and harvesting rates	21
3.2	Harvesting quotas	22
3.3.	Selection of game to be harvested	23
3.4	When and where to harvest	24
3.5	Maintaining a sustainable population	25
3.6	Mitigation of harvests with other forms of sustainable use	26

CHAPTER 4

ANTE MORTEM ON-FARM INSPECTIONS

4.1	Harvesting permits and programmes	27
4.2	Ante mortem farm inspection	28
4.3	Diseases and pathological conditions	29
4.3.1	Diseases	
4.3.1.1	Anthrax	
4.3.1.2	Foot-and-mouth disease	
4.3.1.3	Rabies	

4.3.1.4	Brucellosis	
4.3.1.5	Malignant catarrhal fever	
4.3.1.6	Botulism	
4.3.2	Pathological conditions	
4.3.2.1	Peritonitis	
4.3.2.2	Pneumonia/Pleuritis/Pleuropneumonia	
4.3.2.3	Endoparasites	
4.3.2.4	Ectoparasites	
4.4	Verification of game numbers and terrain	34
4.5	Checks on potability of water	34

CHAPTER 5

SETTING UP A FIELD ABATTOIR

5.1	Location	35
5.2	Equipment	35
5.3	Lighting	36
5.4	Water	36
5.5	Hygiene	37
5.6	Pre-operational cleaning and sanitation	37
5.6.1	Harvesting vehicles and equipment	
5.6.2	Field abattoir and equipment	
5.7	Dress code for workers	39
5.7.1	Dress code for harvesters	
5.7.2	Dress code for field abattoir workers	
5.8	Hygiene code of conduct for workers	40

CHAPTER 6

SHOOTING AND EXSANGUINATION

6.1	Animal health and welfare during harvesting	41
6.2	Mitigation on off-road driving	41
6.3	Shooting skills and exsanguination	42
6.4	Marking and registration of carcasses for sites of origin	45

CHAPTER 7

TRANSPORT OF SHOT GAME TO FIELD ABATTOIR

7.1	Requirements for harvesting vehicles	47
7.2	Options for evisceration of white offal	48
7.3	Hygiene management during evisceration of white offal	49
7.4	Procedure for evisceration of white offal	49

CHAPTER 8

FIELD ABATTOIR PRACTICES

8.1	Off-loading of carcasses	51
8.2	Sterilising of knives	51
8.3	Hand washing	52

8.4	Hygiene and sanitation	52
8.5	Inspection of stomachs and intestines	53
8.6	Removal of front and back feet	54
8.7	Removal of head	54
8.8	Removal of reproductive organs and anus	54
8.9	Removal of the pluck (red offal)	55
8.10	First post-mortem inspection at the field abattoir	56
8.11	Detained/suspect carcasses	57
8.12	Completion of harvesting documentation	58

CHAPTER 9

LOADING OF CARCASSES INTO REFRIGERATION VEHICLES

9.1	Refrigeration vehicle requirements	59
9.2	Hygienic loading of carcasses	60
9.3	Measurement of carcass pH	61
9.4	Measurement of carcass temperature	61

CHAPTER 10

TRANSPORT OF CARCASSES TO GAME HANDLING FACILITY

10.1	Transport of carcasses requirements	63
10.2	Checking of documents accompanying consignment	64
10.3	Off-loading of carcasses at game meat handling facility	64

CHAPTER 11

DISMANTLING OF FIELD ABATTOIR

11.1	Post-operational cleaning and sanitation	65
	11.1.1 Harvesting vehicles and equipment	
	11.1.2 Field abattoir and equipment	
11.2	Regulations for removal and selling of by-products	66

CHAPTER 12

	RELEVANT CONTACT DETAILS	70
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Springbok (Source: D de Bod)

1.1 Commercial rights over wildlife

Namibia is well known for its high-quality game meat and game meat products. Tourists often praise this attribute of Namibian game meat as it is regularly offered on the menu in restaurants, guest houses and lodges. The utilisation of game meat is linked to Article 95 of the National Constitution, which states that “*the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at the ... maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future*”. In addition, Namibia’s Vision 2030 aims to ensure biodiversity conservation and the sustainable utilisation of the country’s wildlife for economic benefits. The game industry in Namibia is regulated by the Ministry of Environment and Tourism through the Nature Conservation Ordinance no. 4 of 1975 as amended.

Namibia’s freehold farmers have had ownership rights over land and livestock since the early 1900s, although the commercial rights over wildlife and indigenous plants was only given to freehold farmers in 1967. Farmers in communal areas received the same rights much later (1996 and 2001) when policies were adopted to promote community-based natural resource management. The implementation of these policies resulted in wildlife being utilised and valued by the private sector, driving the wildlife sector into a rapid growth phase.

Namibia has a number of regulations that apply to the sustainable use of game which are applicable when harvesting game for commercial game meat production. Countries importing game meat, such as South Africa and the European Union, also lay down specific rules and regulations to which exporting countries must conform. **Only harvesting teams registered with the Namibian Directorate of Veterinary Services (Ministry of Agriculture, Water and Forestry) and the Namibian Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism) are allowed to harvest for the commercial export of game meat.**

Harvesting teams should have well-documented and implemented Hygiene Management Systems in place as required by the importing country, before the meat harvested from game is suitable for export to other countries. In Namibia the Directorate of Veterinary Services is the competent authority regulating meat exports.

1.2 Wildlife populations

Namibia has an abundance of wildlife. There are at least two million head of game (Table 1), a figure roughly similar to those for cattle, sheep and goats. Approximately 90% of the wildlife is located outside formally proclaimed conservation areas. More than 80% of the larger game species are found on privately owned farms which comprise about 44% of the surface area of the country.



Game at waterhole, Etosha (Source: Francesco Villa)

Species	Protected areas	Communal areas	Freehold farms	Total
Springbok	18923	91070	621561	731663
Gemsbok	8265	30054	350092	388411
Kudu	2497	3595	345801	351893
Warthog	209	40	173866	174115
Red Hartebeest	1583	700	122805	125088
Hartmann's Zebra	3974	13242	55520	72736
Ostrich	3787	5550	36336	45673
Eland	2084	389	34743	37216
Burchell's zebra	18098	20	7303	25421
Blue wildebeest	5199	470	16623	22292
Common impala	77	385	14980	15442
Giraffe	3491	1155	5769	10415
Elephant	8993	964	0	9957
Leopard	2000	2000	4000	8000
Cheetah	765	765	2970	4500
Waterbuck	0	0	4475	4475
Blackfaced impala	1500	0	1870	3370
Hippopotamus	1262	300	0	1562
Buffalo	1275	90	0	1365
Sable antelope	316	15	902	1233
Roan antelope	560	95	435	1090
Others	1536	432	655	2623
Total	86403	151331	1800706	2038440
Percentage	4%	8%	88%	100%

Table 1. Wildlife numbers in Namibia (Source: Mendelsohn, 2006)

Protected areas: Numbers are based on a 2004 aerial census and, therefore counts for some of the smaller animals are not representative of the current populations.

Currently at least 41% of Namibia is under wildlife management as shown in Figure 1. Some 60 communal conservancies are now registered, bringing the area under communal conservancy management to about 15.3% of the area of Namibia. State protection comprises 16.5%, freehold conservancies 6.1%, private protected land 2.1% and community forests and concessions 1.3%.

1.3 Different ways of marketing wildlife

Wildlife in Namibia is traditionally marketed in four different ways, namely as non-consumptive tourism, trophy hunting, sale of live game and game meat.

Namibian tourism is the strongest driving force behind the growth of the wildlife industry. This sector is envisaged to grow at 6.9% per annum between 2008 and 2017. Namibia's Tourism Satellite accounts show that in 2006 tourism established directly and indirectly (through support industries to the tourism sector) about 71 777 jobs and contributed N\$6.8 billion to the Gross Domestic Product (GDP).

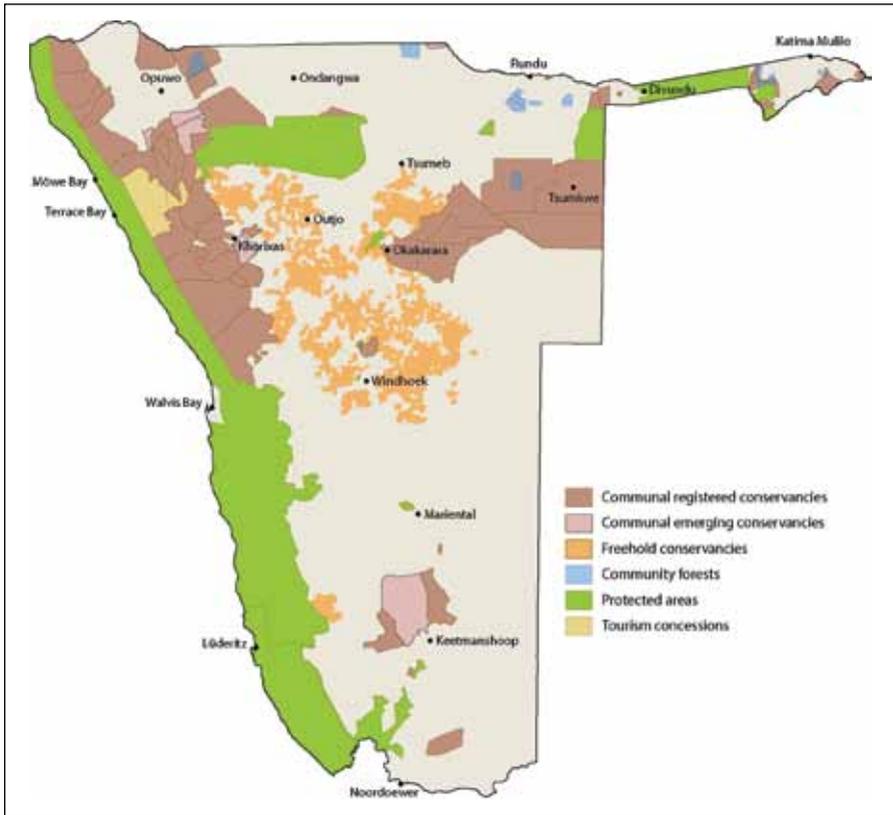


Figure 1. Areas in Namibia under wildlife management (Source: Brown, 2009)

There are four marketing channels for selling live game, namely:

- Direct sales from game dealers to farmers, comprising 30% of all sales;
- Sales at auctions, comprising 16% of all sales;
- Live exports, mainly to South Africa, comprising 46% of all sales; and
- Other (i.e. farmer to farmer sales).

Trophy hunting is part of the Namibian tourism industry, contributing approximately 14% to the total tourism industry with revenue generated of at least N\$134 million. Trophy hunting mainly offers recreational hunts to upper-income hunters from overseas. Most hunting is on private land and packages offered comprise mainly of plains game species. Namibian landowners with sufficient fenced-in wildlife stocks can register with the government as hunting farms and offer hunting operations (Nature Conservation Ordinance no. 4 of 1975). On public land government and community conservancies can offer hunts. Trophy hunting is only allowed in the company of a registered hunting guide. Trophy hunt-

ing takes off about 1% of the national wildlife herd and far less in some species. It is thus not a population-regulating mechanism, as wildlife populations usually increase at 15-35% per annum, depending on the species.

Wildlife numbers in Namibia have more than doubled over the past thirty years. Game harvesting with the purpose of satisfying local and export demand for game meat is still in its infancy. This sector has significant potential for growth. Game harvesting is also of ecological importance since it provides a tool to landowners and custodians of land to manage wildlife numbers for ecological carrying capacity in an often very rapidly changing climatic environment. Landowners or custodians of land with fenced and non-fenced (open) land can apply for a shoot-and-sell permit (day harvesting) or a night-culling permit to harvest game for commercial meat production. For own consumption of huntable game, no permit is required – only if the meat is to be transported off the property for commercial purposes. Only registered and properly trained harvesting teams are permitted to harvest game for meat export.

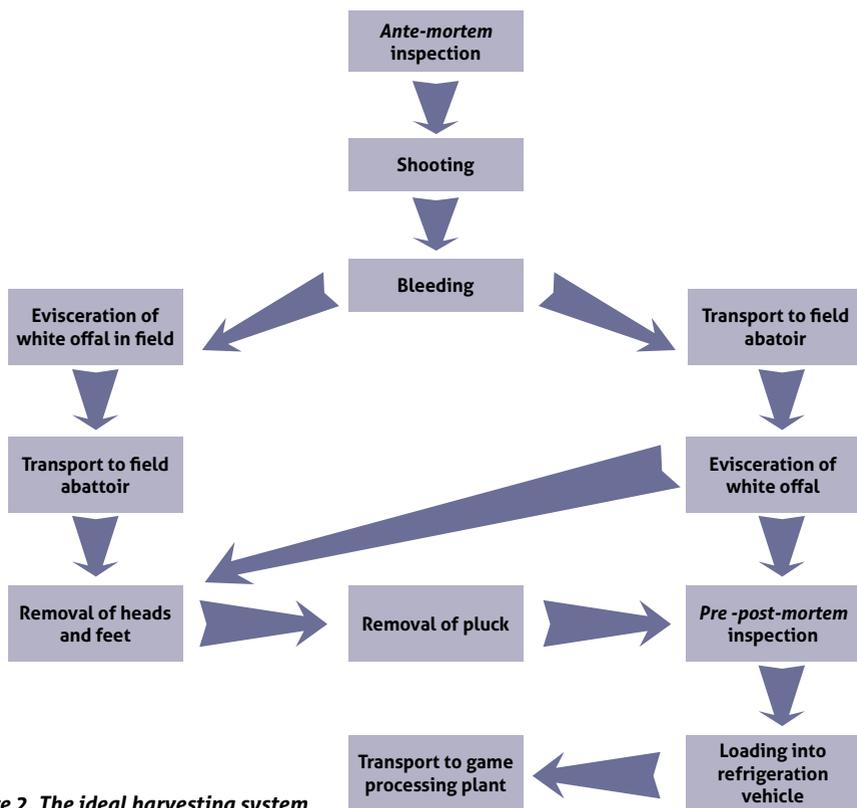


Figure 2. The ideal harvesting system

The following categories of game are recognised in Namibia (also stipulated in South African legislation):

- *Category A (large game)*
Elephant, hippopotamus, giraffe and buffalo.
- *Category B (medium game)*
Wildebeest, kudu, eland, gemsbok, red hartebeest, Hartmann's zebra, etc.
- *Category C (small game)*
Impala, springbok, blesbok, duiker, etc.

Areas	Red hartebeest	Hartmann's zebra	Kudu	Gemsbok	Springbok
Total wildlife	137 098	72 807	381 511	399 464	749 090
Total south of Veterinary Cordon Fence	137 098	70 107	381 171	389 264	726 090
Freehold	137 098	67 407	378 571	383,764	684 353
Communal	0	2 800	2 600	5 500	42 350
	0%	4.00%	0.70%	1.40%	5.80%
Total north of Veterinary Cordon Fence	-	2 700	340	10 200	23 000
	0%	3.70%	0%	2.50%	3.10%

Table 2. Population numbers of game species suitable for meat production (Source: Brown, 2007)

1.5 Ethical and sustainable harvesting

Important issues for the consumer are environmental sustainability, good wildlife management systems and high ethical standards applied during the production, harvesting and processing of the meat products (including carbon footprint and animal welfare consideration). When game populations are harvested for meat production, long-term sustainable harvesting should always be a precondition.

The ideal harvesting system should allow for the management of population structure without disrupting population growth. Indeed, population growth may be enhanced. The harvesting methodology applied should adhere to all ethical requirements to ensure that no negative perceptions are fostered within the targeted consumer market. It is also important to know that a landowner or custodian may be managing wildlife populations for a number of different products, including trophy hunting, live sales and tourism. Game harvesting should be planned and implemented in ways that promote the optimisation of the total wildlife production system.

The following should be avoided when harvesting game for meat:

- Shooting of trophy animals;
- Causing undue disturbances that impact negatively on flight distances, as this will negatively affect other activities, especially the non-consumptive activities such as photographic tourism; and
- Significantly skew sex and age ratios of populations that negatively impact on population growth rates.



Day harvesting (Source: Mos-Mar Harvesting Team)

1.6 Eating qualities of game meat

Consumers are becoming increasingly more health conscious, focusing on lean and low-fat meat. Meat is required to be safe in terms of its composition, preferably with no artificial additives added in the animal's diet or the product. The consumer is willing to pay more for meat which is free from micro-organisms, antibiotics and hormones. Game meat has a fat content of 2-3% and is therefore lower in fat than domestic species, giving it a competitive edge in consumer markets. Game meat is also a protein-dense food resource (high density of proteins per gram of meat). Organic food products are highly in demand and therefore marketing game meat as an organic product will positively influence game meat consumption.

1.7 Game meat value chain

Several intermediate steps are needed before game meat reaches the consumer.

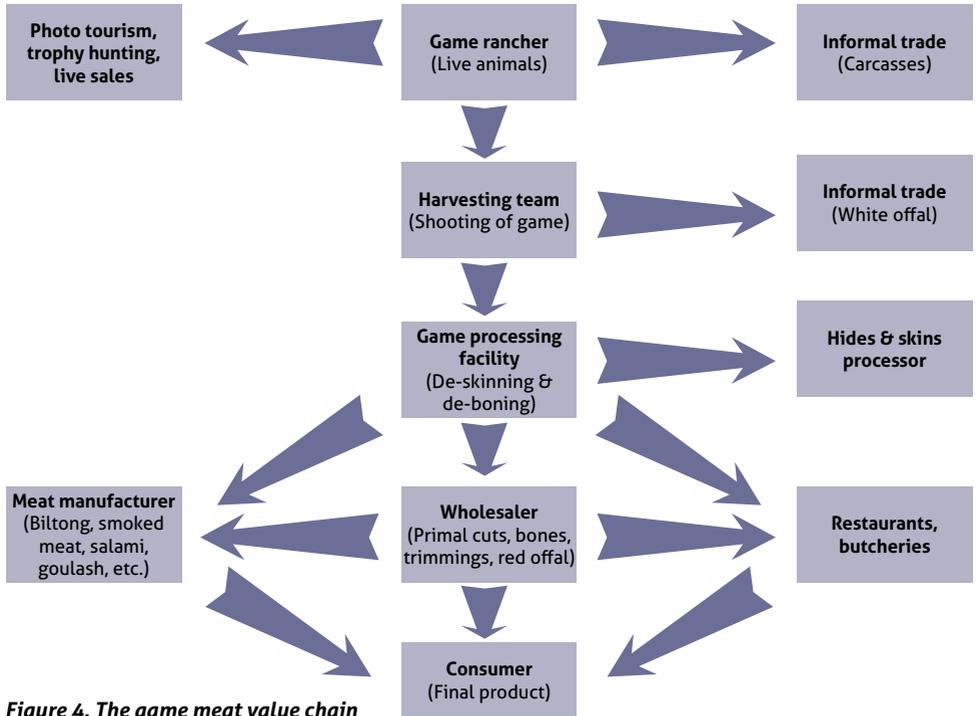


Figure 4. The game meat value chain

1.8 Contribution to sound rangeland and environmental management

Game populations naturally increase in numbers, typically at a rate of 15-35% per year. If uncontrolled, particularly on fenced land, game numbers rapidly exceed the carrying capacity of the land. This results in rangeland degradation, loss of species diversity, loss of perennial grasses, poor water retention, soil erosion, declining productivity of the land and increased vulnerability to climatic variations. It also leads to game being in poor condition, increased susceptibility to diseases, poor lambing and calving rates and low-value animals. Trophy hunting, live capture and sales can remove only a small proportion of game populations. Harvesting is an important mechanism for managing wildlife populations within economic production systems. Without an efficient game harvesting mechanism in place, Namibia runs the risk of severe overgrazing and environmental degradation from its growing wildlife populations.

1.9 Contribution to the national economy

In terms of income to landowners and conservancies, the game meat market has the current potential of generating revenue in excess of N\$300 million annually. The additional income to harvesting teams, abattoirs, exporters and outlets could make the game meat industry worth at least N\$500 million per year.



Gemsbok (Source: D de Bod)



Hartmann's zebras (Source: D de Bod)

2.1 Veterinary, Wildlife and Food Acts/Regulations

The Nature Conservation Ordinance no. 4 of 1975 as amended and the associated regulations make provision for the rules and regulations pertaining to local and commercial harvesting of game, registering of game harvesting teams, as well as the registration of hunting farms with populations of suitable game species. Importing countries normally have very stringent food acts and regulations in place by which the exporting country must abide before meat can be approved for export. The objective of these acts and regulations is to protect the consumer by safeguarding animal health, public health, food safety, animal welfare requirements and the traceability of foods of animal origin to its point of production.

Namibian requirements

- Animal Diseases and Parasites Act no. 13 of 1956 and its regulations as amended;
- Prevention of Undesirable Residues in Meat Act no. 21 of 1991 as amended;
- Animal Protection Act no. 71 of 1962 as amended; and
- Veterinary Circulars (VC).

South African requirements

- Meat Safety Act no. 40 of 2000;
- Red meat regulations (17 September 2004); and
- Veterinary Procedural Notices (VPN).

European Union requirements

- Commission Regulation no. 178/2002, laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety;
- Commission Regulation no. 1441/2007, amending parts of Regulation no. 2073/2005 on microbiological criteria for foodstuffs;
- Commission Regulation no. 2073/2005, on microbiological criteria for foodstuffs;
- Commission Regulation no 2075/2005, laying down specific rules on official controls for *Trichinella* in meat;
- Commission Regulation no. 854/2004, laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption;
- Commission Regulation no. 852/2004, on the hygiene of foodstuffs;
- Commission Regulation no. 853/2004, laying down specific hygiene rules for food of animal origin;
- Commission Decision 2008/752/EC, amending Annexes 1 and 11 to Council Decision 79/542/EEC, as regards certification requirements for imports into the community of certain live ungulate animals and their fresh meat;
- Council Directive 98/83/EC, on the quality of water intended for human consumption.
- Council Directive 2002/99/EC, laying down the animal health rules governing the production, processing, distribution and introduction of products of animal origin for human consumption; and
- Council Directive 2003/99/EC, on the monitoring of zoonosis and zoonotic agents.

The recommendations in this guideline cover all the necessary requirements to export game meat to markets in South Africa and the European Union.



Red hartebeest (Source: D de Bod)

2.2 Registration of harvesting teams for commercial harvesting

The registration of harvesting teams is required for commercial and communal areas.

Step 1

Registration with the Ministry of Environment and Tourism

(Permit Office, Tel. 061 - 2842518)

Harvesting teams wishing to harvest for game meat exports must register with the Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism). The harvesting team must consist of at least three harvesting units with a suitable vehicle for each marksman.

In the application to be registered, the following details must be stated:

- The names of all the persons in the group who intend to act as marksmen;
- The names of all the persons who intend to act as light operators;
- The name of the team leader;
- The name of the assistant team leader;
- If the group has six or more harvesting units, one additional assistant team leader must be named for every three harvesting units;
- The vehicles to be used in the harvesting operation (each vehicle must have a separate amber-coloured flashing light that is visible from all sides during the harvesting operation);
- The names of the licensed motor drivers of such vehicles;
- The firearms, their velocity and the magnifying ability of the telescopes (Compliance with Section 42 of the Nature Conservation Ordinance no. 4 of 1975); and
- The available lighting (every marksman must have one shooting lamp of 55 watt with an efficiency distance of 200 metres):

A provisional registration is issued for two months. During the two months, the harvesting team is tested in order to determine whether it meets the conditions for registration. Every registration is subject to the condition that the game harvesting team may operate under the supervision of an official of the Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism). A registration certificate is issued against a fee (N\$100.00 in 2009) and is renewable annually before or on 30 April.

The harvesting team is tested according to the following:

- A suitable team leader at its disposal;

- At least three marksmen at its disposal who 1) are able and qualified to distinguish between different species with an artificial light, 2) can shoot at least 95% head and neck shots at night, 3) can bleed game carcasses efficiently, 4) can remove intestines hygienically, and 5) safely handle fire arms;
- At least one light operator per marksman who 1) is able to force game to a standstill by means of an artificial light, 2) can distinguish between different species, 3) can bleed game carcasses efficiently, 4) can remove intestines hygienically and, 5) act safely during harvesting; and
- The necessary equipment as mentioned above at its disposal for the harvesting operation.

During harvesting operations the registration certificate must be in the possession of the member to whom it was issued. There may be no more than one car driver, two marksmen, two light operators and two helpers when small game is harvested. When large game is harvested, only one car driver, one marksman, two light operators and four helpers are allowed. Following every harvesting operation, a harvesting report (Afr. "skietlys") must be forwarded to the Ministry of Environment and Tourism with the necessary details as set out in Chapter 7.

Step 2

**Registration with the Ministry of Agriculture, Water and Forestry
(Directorate of Veterinary Services, Division of Veterinary Public Health,
Tel. 061 - 2087509 / 061 - 2087505)**

Harvesting teams who intend to harvest for game meat exports must register with the Directorate of Veterinary Services. Application forms must be completed and submitted to the nearest State Veterinary Office together with proof of registration with the Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism) and a copy of the certificate for the nominated Game Meat Examiner (See 2.7). Proof must be given that the members of the harvesting team were submitted to a medical examination (See 2.5). Inspection of equipment must take place at the State Veterinary Office or at the point of harvesting. The applications must be submitted at least twenty-one (21) days prior to the date of the intended harvest. For authorised harvesting teams, the Harvesting Programme must be forwarded to the regional State Veterinary Office seven (7) days prior to the intended harvesting day. Notice of cancellation of the harvest must be given to the regional State Veterinary Office at least twenty-four (24) hours prior to the harvest.

Prospective harvesting teams must familiarise themselves with the details contained in

the Veterinary Circulars. Copies of these Veterinary Circulars must be with the field team at all times. The leader of the harvesting team must make sure of his/her assistant harvesters' competencies in slaughter techniques and the procedures applicable. An official of the Directorate of Veterinary Services will accompany the harvesting team during harvesting operations to ensure that the following stipulations are in place:

- Compliance with work procedures (transport, equipment, water, etc.);
- Cleaning and sanitation (chemicals used for water and equipment);
- Workers' health and hygiene;
- Control over game harvesting (number of healthy carcasses, suspect carcasses, ante and first post-mortem records, traceability, temperature and pH recordings, etc.); and
- Food safety and animal welfare issues (HACCP plan (See 2.6)).

A harvesting team complying with the requirements will be issued with a registration certificate containing a registration number.

2.3 Operation of harvesting teams in communal conservancies

A conservancy is a social unit of management where a group of communal residents get together and agree that they want exclusive rights over the wildlife and tourism in their area. The Namibian government devolves these rights to the conservancy, once a set of conditions has been met, allowing the Ministry of Environment and Tourism (Division Wildlife Management) to register the conservancy. The registration is published in the Government Gazette. The conditions include that the conservancy has clear, undisputed boundaries, a membership list reflecting the wishes of the people to form a conservancy, an appropriate constitution that clearly states the goals and objectives of the conservancy, and a representative conservancy committee. Harvesting teams wishing to harvest in communal conservancies need to follow the same route of registration as described above. The State Veterinary Office closest to the conservancy should be contacted in this regard.

Conservancies have full rights to use and control the use of any game on communal lands and to receive all the benefits. Effectively they have the same rights as any freehold game rancher. The conservancy may decide to utilise some of its quota as allocated by the Ministry of Environment and Tourism (Division Wildlife Management) through trophy hunting, own use or commercial harvesting (shoot-and-sell permits (day), or night harvesting or culling). With trophy hunting and own use, the meat usually stays in the conservancy and is distributed to the members. With commercial harvesting game is harvested as part of an organised harvesting operation and the meat is sold with all proceeds going into the

conservancy's bank account. The conservancy will either use its own staff to undertake the harvest or may contract a commercial harvesting team to undertake this work on their behalf. In certain cases, the conservancy may enter into a contract with a commercial harvesting team where the operator will pay for a specific number of animals and then be responsible for all harvest and transport costs. These contracts should specify the place of harvest, time period of harvest, and number, species and gender ratios of game to be harvested.



Training of harvesters (Source: Abattoir Association of Namibia)

Once a conservancy is registered with the government, a few follow-up actions are needed. The preparation of a wildlife management plan with land use zonation and a benefits distribution plan must be developed. It is entirely up to the conservancy to decide on and authorise how its wildlife resources and income will be used. Conservancies in Namibia vary in size from about 25 000 ha to almost one million ha. These conservancies manage and monitor their wildlife on a day-to-day basis, carrying out patrols and annual game counts whereafter the observations are recorded on data forms. Harvesting teams are contracted by the conservancy and need to fully understand the conditions contained in the harvesting contract as well as the broad management plan of the conservancy. The management plan is one of the documents required by the Ministry of Environment and

Tourism (Division Wildlife Management) to utilise wildlife and thus will have been authorised by the Ministry. It should take preference over any agreements in the harvesting contract, particularly in relation to where harvesting will be allowed (i.e. the zonation plan of the conservancy). If there is conflict between the contract and the management plan the harvesting teams should bring this to the attention of the conservancy and/or the Ministry of Environment and Tourism (Division Wildlife Management) to resolve the issue. Only the Ministry of Environment and Tourism (Directorate of Parks and Wildlife Management) can determine harvesting quotas in communal areas.

2.4 Payment procedures

The current practice in Namibia to procure game meat for export establishments/processing plants is the following:

- The game meat export establishment/processing plant enters into an agreement/contract with a game harvesting team to harvest specific species for an agreed period/season for the establishment/processing plant;
- The game meat export establishment/processing plant liaises with game producers (commercial or communal), bookings for harvesting operations are fixed and a harvesting programme is drafted;
- The harvesting programme is forwarded by the harvesting team leader to the nearest State Veterinary Office at least seven (7) working days before the shooting;
- The price to be paid to the game producer by the game meat export establishment/processing plant is agreed (in 2009 this usually varied between N\$15.00 and N\$18.00 per kg partially dressed carcass);
- The price to be paid to the game harvesting team for its services to deliver the partially dressed carcasses to the game meat export facility is agreed (in 2009 this was typically about N\$7.50 per kg). The quality criteria of the carcasses are also agreed upon. Game harvesters are often penalised for body shots.

2.5 Medical check-ups for game harvesters

Game harvesters are obliged to go for annual medical check-ups in order to obtain a Food Handlers' Certificate from a general practitioner. Medical check-ups must include the following:

- Testing for the presence of salmonella (Widal blood test);
- Screening for *tuberculosis* (X-rays); and
- A general health check.

2.6 HACCP plan and record keeping

The primary responsibility for food safety rests with the food business operator. It is necessary to ensure food safety throughout the food chain, starting with primary production. Food business operators must therefore establish, implement and maintain hygiene management systems and control procedures based on HACCP (Hazard Analytical Critical Control Points) principles. This is applicable to the harvesting of game for meat exports to the European Union (EC Regulation 852/2004) and other countries such as South Africa (Meat Safety Act no. 40 of 2000). The hygiene management system implemented by the game harvesting team has to comprise standard operational procedures (SOPs) for every operation executed by the teams. The system must also comprise sanitation standard operational procedures (SSOPs) for pre-, during and post-operational cleaning and sanitation. Within the system critical control points for the system have to be defined, monitored, recorded and verified.

A hygiene risk assessment is used to determine critical control points (CCPs) for the game harvesting process. Typical critical control points defined are:

- Checks on the potability of the water from the farms where the harvesting takes place;
- Checks on faecal contamination of the partially dressed carcasses; and
- Checks on temperatures of the carcasses after being loaded into the refrigeration vehicles.



Ante-mortem farm inspection (Source: Mos-Mar Harvesting Team)

The detection of metal fragments from bullets need not necessarily be considered as a critical control point. Only head shots are accepted and most bullets are of the type that explodes inside the skull. Checklists must be developed for all the items to be measured within the SOPs, SSOPs and CCPs. It is recommended that harvesting teams seek professional advice in drafting these documents.

2.7 Training of game meat examiner

Persons who harvest game with the view of placing the meat on the market for human consumption must have sufficient knowledge of game and the production and handling of game and game meat after harvesting in order to undertake an initial examination of the animal in the field. It is sufficient for the harvesting team to have at least one person trained as a Game Meat Examiner. The trained person could also be the game rancher, gamekeeper, or the game manager, if he or she is part of the harvesting team or located in the immediate vicinity from where the harvesting is to take place. In the latter case, the hunter must present the game to the game rancher or game ranch manager and inform them of any abnormal behaviour observed before killing. Any abnormal condition detected in the live game animal or during the evisceration or bleeding of a carcass should be reported to the Game Meat Examiner and then to the state veterinarian.

Training of the Game Meat Examiner and persons who harvest game (usually conducted by an export abattoir veterinarian) should cover at least the following subjects:

- The anatomy, physiology and behaviour of game;
- Abnormal behaviour and pathological changes in game due to diseases, environmental contamination or other factors which may affect human health after consumption;
- The hygiene rules and proper techniques for the handling, transportation, evisceration, etc. of game after killing; and
- Legislation and administrative provisions on animal and public health and hygiene conditions.

During the course of the harvesting operation the Game Meat Examiner must do periodic checks to ensure that the procedures comply with the requirements. If practices of non-compliance and malpractice are observed, the team leader must be informed and harvesting must be stopped.

2.8 Checking of relevant documentation before harvesting

The documents accompanying the harvesting operation are the following and must be checked by the Game Meat Examiner:

- Copies of Notices of Harvesting given to the officials of the Directorate Parks and Wildlife Management (Ministry of Environment and Tourism) and the Directorate of Veterinary Services (Ministry of Agriculture, Water and Forestry);
- Ante-mortem Health Declaration where applicable;
- Proof of qualification/training of the Game Meat Examiner ;
- Copy/Copies of registration certificate(s) of harvester(s) with the Directorate of Parks and Wildlife Management and the Directorate of Veterinary Services;
- Health certificate(s) of harvester(s) as well as of assistants including copies of identity documents;
- Game harvesting report (Afr. "skietlys");
- Recording of detained/suspect carcasses;
- Checklist for workers' health and hygiene;
- Checklist for cleaning and sanitation;
- Checklist for compliance with work procedures;
- Corrective Action Form;
- Calibration certificates (Refrigeration vehicle, thermometers, pH meters); and
- Applicable legislation.



Kudu (Source: D de Bod)

The ideal harvesting system should allow for the management of population structures of different wildlife species without adversely disrupting their population growth rates. Harvesting should be economical and the period of harvesting should be as short as possible. The harvesting team must ensure that the end product is of high quality. It is therefore extremely important that the cold chain is maintained throughout the game meat value chain. The ideal harvesting system should allow only minimal ecological and physiological disruption and must be ethically and aesthetically acceptable to the game producer as well as the consumer.

3.1 Growth and harvesting rates

The natural growth rate of an undisturbed population is equal to the birth rate and natural deaths. Various phases of growth of a population maintain different growth rates, resulting in a typical sigmoidal (S-shaped) growth curve. It is sometimes difficult to know in which growth phase a game population is at a given moment. The observed growth rate as calculated from trends observed during successive game counts can be used when determining the harvesting rate. Theoretically the harvesting quota will be equal to the growth rate, which will result in a population with constant numbers. In semi-arid to arid environments, as occur in Namibia, the rainfall and thus primary production is highly variable. Animal biomass must be managed to ensure that the carrying capacity of the

vegetation is not exceeded and that ecosystems are not damaged. The harvesting quotas, in combination with other forms of utilisation such as own use, trophy hunting and live capture for sale, should be carefully determined to take all these factors into account.

Growth rates on a ranch can be manipulated by changing the availability of water and food or in a more direct manner, by hunting, which can have two main impacts namely, direct reduction in wildlife numbers, and managing game population gender ratios to enhance production. Wildlife numbers will grow to exceed carrying capacity, particularly in fenced areas, and will then cause ecosystem degradation.

Populations managed for production should be held on the steep slope of the sigmoidal curve and significantly below maximum carrying capacity to ensure that -

- optimal production is achieved;
- animals are in good condition and breeding well; and
- rangeland condition is protected.



Trophy hunting (Source: Ndumo Hunting Safaris)

3.2 Harvesting quotas

Harvesting game in order to keep populations below the ecological equilibrium, results in more environmental resources utilised. This improves the productivity and survival rate of game. However, a game population which is reduced to too few animals will result in the population shifting to a slow-growth phase and it will thus take longer for the population

to recover to a harvestable state. The correct gender ratio is also important to manage for optimum growth. Various techniques exist to calculate the harvesting quota for different game populations.

Game harvesters should familiarise themselves with the important variables which are taken into account in using various techniques to determine game harvesting quotas. Useful hints in this regard can be found in the reference book *Game Ranch Management*, as edited by J. du P. Bothma (2002).

3.3 Selection of game to be harvested

When harvesting for meat production, it is recommended that only carcasses of one type of species should be placed in a single refrigeration vehicle. If species are however mixed, clean strong plastic sheeting must be used to divide the different species in the refrigeration vehicle (see 9.2). A second refrigeration vehicle is therefore often needed if two species are harvested at the same time.

Whatever the objective of the harvesting operation, animals from both sexes must be harvested to maximise reproduction potential. However, selective harvesting of one sex group is often required since most natural game populations have a surplus of males. Reducing the males leaves lactating females and females in gestation with more environmental resources, especially in the dry winter times.

The general rule is to have three (3) females for every male in a population. Enough males of the correct age must, however remain in the population to ensure successful breeding with the females. A single male will tend to chase around young animals and in the absence of competition from other males will not breed well. This defensive territorial behaviour plays an important role ensuring the optimal reproduction of game.

Selecting certain age groups for harvesting for meat production is recommended. A percentage of young animals in their first year can be harvested before the onset of the dry winter months. In any game population there are females that do not contribute to the population growth and they should be harvested first. It is important to keep young females that can be added to the breeding group the following year for an optimal yield. When selective harvesting of males is done, some young males that are not yet of trophy status should also be left to ensure that they will become replacement males in the following year.

Although selective harvesting has certain advantages, random harvesting distributed proportionally over the population is the generally recommended practical approach. Selective harvesting by species may result in a decrease in numbers of one species and an increase of the other. This may have an influence on the environmental resources and ecology.

3.4 When and where to harvest

The time of harvesting is important, especially during mating and birth seasons, and a rest period of at least a month before and after each of these periods is recommended. Disruption can influence the impregnation and implantation of the embryo. Game should also not be disrupted during mating (negative growth rate) or calving/lambing (unethical) and mothers should not be separated from their off-spring (infants may starve to death).

The mating season for African ungulates is usually in the late summer (February – March). Offspring are normally born in late spring (October – November). The springbok has a gestation period of five and a half (5½) months, the kudu seven (7) months, the red hartebeest eight (8) months, gemsbok nine (9) months and the Hartmann's zebra twelve (12) months.



Game at waterhole (Source: Hans Hillewaert)

In Namibia the night culling/harvesting season for game harvested for commercial meat production usually commences in April and ends in August (currently under review). Shoot-and-sell permits (for day harvesting to supply the local market) can be obtained throughout the year.

The terrain must be suitable for the harvesting operations to take place. Harvesting at night can only occur where the area is not too rocky and where harvesting vehicles can drive around at night. Every harvesting operation is different and game species to be harvested must be selected accordingly. This is extremely important in areas where ecosystems are fragile and where disturbance can take many years to recover. No game may be harvested within a 20 km range from an international boundary of a country (or a part thereof) not authorised to export fresh meat to the particular market as stipulated in the export certificate for game meat.

Species	Harvesting season for meat exports
Springbok	1 April - 31 August
Gemsbok (south of Windhoek)	1 April - 31 July
Gemsbok (north of Windhoek)	1 April - 30 June
Kudu	1 May - 31 August
Hartmann's zebra	Only on approval of the Director of Parks and Wildlife (1 May - 31 August)
Red hartebeest	Only on approval of the Director of Parks and Wildlife (1 May - 31 August)

Table 3. Harvesting seasons for meat exports (Source: Ministry of Environment and Tourism)
Extension of date can be applied for from the Ministry of Environment and Tourism.

3.5 Maintaining a sustainable population

The aim of sustained harvesting is to remove a certain number of animals every year from the game population without it resulting in a long-term decline of the population. Short-term changes in population sizes are required to adapt to the highly variable climatic conditions in Namibia. When a game population remains fairly stable in the long term it is at an ecological equilibrium.

It is recommended that a game population should be harvested every two to four years . This can increase the production of some species by 10-20%.

- Remember the good years!
- Plan for the bad years!

3.6 Mitigation of harvests with other forms of sustainable use

Game ranchers benefit from wildlife in different ways, through both consumptive (trophy hunting, capture and sale of surplus live animals, own use and harvesting for meat production) and non-consumptive use (tourism). When the rancher allows trophy hunting on his/her farm, maintaining an excess of males on the ranch is preferred. The level of surplus can then be determined by comparing the profitability between harvesting for meat production and trophy hunting. Young mature males usually obtain optimal trophy quality only at the age of five to six years.

Tourists on the farm should not be exposed to the harvesting operations. Although harvesting for meat exports is conducted in an ethical way, tourists from an urban environment may not like to be exposed to the realities of meat production systems. Remember, they came from far to appreciate the live animals!



Kudu (Source: D de Bod)



Springbok (Source: D de Bod)

4.1 Harvesting permits and programmes

An official permit for harvesting at night must be obtained from the Permit Office of the Ministry of Environment and Tourism (Tel. 061 - 284 2562/061 - 284 2539) and the nearest Wildlife Office must be informed of the harvesting operation at least seven (7) days before commencement. A Harvesting Programme should be submitted to the nearest State Veterinary Office at least seven (7) working days before the shooting. Notice of cancellation of the harvesting operation must be given to the regional State Veterinary Office at least twenty-four (24) hours prior to harvest. The Harvesting Programme must comprise the following information:

- Date of intended harvest;
- Name and contact details of team leader;
- Name and registration number of the farm(s);
- Game Meat Examiner's name;
- Name of receiving export establishment/processing plant with contact details; and
- Species and numbers to be harvested.

All immediate neighbours must be notified at least seven (7) days before the intended harvest. No harvesting may take place on weekends or public holidays unless by prior arrangement with the nearest State Veterinary Office and Wildlife Officer. The owner of the farm where the harvesting operation is going to take place must provide the Game Meat

Examiner with any information regarding controlled disease outbreaks within a radius of ten (10) km of the area of harvesting. Care must be taken that game is not harvested from areas where hazards occur which may affect the safety of the meat.

4.2 *Ante-mortem* inspection

What is an *ante-mortem* inspection? This is an inspection that is done when the animals are still alive, at least one (1) to seven (7) days before the intended game harvesting, to determine whether the animals are fit to slaughter for human consumption. There are some animal health conditions that can only be assessed when animals are alive. Only animals that can be transformed into a wholesome and safe product can be harvested. The aims of *ante-mortem* inspections are to identify -

- Any condition which might adversely affect human or animal health, paying particular attention to the detection of zoonotic diseases listed by the OIE (World Organisation for Animal Health);
- Diseases with no clear or specific signs during *post-mortem* inspection (rabies, tetanus, botulism) and/or zoonoses (diseases transferable to humans) like rabies and foot-and-mouth disease;
- Animals suffering from diseases (anthrax) or with symptoms indicating affection of organs (lameness, diarrhoea, mastitis);
- Septic conditions (wounds, abscesses); and
- Prevention of cruelty by removing injured or dying animals (emergency shooting and slaughtering).

Animals may not be harvested unless the hunter assured himself/herself that the animals have a normal healthy appearance. During the farm visit, the harvesting team should consider the following and complete the *Ante-mortem* Health Declaration Checklist:

- History (enzootic disease areas, type of field, and condition of the terrain);
 - General behaviour of the animals in the herd;
 - Movement and posture;
 - Skin and hide condition;
 - State of nutrition; and
 - External features.

Animals may not be harvested for commercial use if the following conditions are evident:

- Injuries or diseases;
- Septic conditions; and
- Excessively soiled animals.

4.3 Diseases and pathological conditions

What is a disease? It is any process that disrupts an animal's normal function. Only diseases and conditions that are of practical importance in game ranching systems in Namibia will be discussed here.

What is a pathological condition? Pathological conditions are often only recognised by swollen lymph nodes. Lumps or nodules under the skin may indicate reactions in the lymphatic system. The lymphatic system defends the animal against infections from bacteria. A network of lymph nodes and lymph vessels are found under the skin (superficial lymph nodes). Some infections may result in enlarged, visible lymph nodes, which are also frequently seen as swellings under the skin.

As soon as there is any suspicion of a disease or condition the Game Meat Examiner must be informed to make a final judgment. The results of all the *ante-mortem* inspections must be recorded and any abnormalities must be stated in the official inspection report (*Ante-mortem* Health Declaration) which must accompany the consignment to the final inspection point for the attention of the veterinarian on duty at the export establishment/processing plant.

Only the most common diseases and pathological conditions affecting game are described in this guideline. The following website can be visited for additional information: www.fao.org/docrep (*Manual on Meat Inspection for Developing Countries*).

4.3.1 Diseases

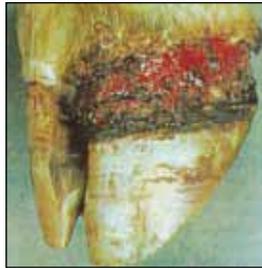
4.3.1.1 Anthrax (Afr. "Miltsiekte")

Anthrax has been a notifiable disease in Namibia since 1901 and vaccination was made compulsory in 1973. The spores are very hardy and can survive for many years in soil or old bones. The most common reason for outbreaks is that animals chew on bones to counteract a phosphate deficiency. Clinical signs differ from species to species with ruminants (like antelope) at the greatest risk. The acute infection usually takes one to three (1 -3) days but may take up to seven (7) days. A high fever is common with initial excitement followed by depression, muscle tremors, staggering, cardiac distress and disorientation prior to death. In the per-acute form of anthrax sudden death may be the only clinical sign. The toxins of the bacteria (*Bacillus anthracis*) prevent the blood from clotting and thus animals have a bloody discharge coming from the nostrils, mouth, ears, anus, etc. The blood is very dark (nearly black) and watery. Be careful and do not open

the carcass as anthrax is a highly contagious disease. The carcass and anything which was in contact with the infected animal must be burned. Knives that were used must be boiled for thirty (30) minutes.

4.3.1.2 Foot-and-mouth disease (Afr. "Bek-en-klouseer")

Foot-and-Mouth disease is considered to be the most economically devastating animal disease in the world. It is highly transmissible, results in huge losses in production and is a notifiable disease. Morbidity can reach 100%, but mortality is usually less than 1%. Transmission of the virus usually occurs via air, or through direct contact with the animals. The virus can survive for one or two days in the human respiratory tract, thus spreading to animals. Fever and blisters develop on the feet, mouth, muzzle and teats and are characteristic signs of the disease. Abortion can occur in adult animals and death in young animals. The virus is inactivated at a pH of below 6.5 or above 11. The decrease in the pH *post-mortem* may inactivate the virus. Under the supervision of the veterinary authorities diseased animals are generally destroyed to prevent further spread of the disease.



Foot-and-mouth disease
(Source: OIE)

4.3.1.3 Rabies (Afr. "Hondsdotheid")

Rabies is an acute notifiable disease affecting wild animals (mammals), domestic animals and humans and usually ends in death without early recognition. The virus generally attacks the central nervous system and no lesions are visible during a *post-mortem* inspection. In Namibia jackals are the most common carriers of the disease. Cattle and kudu are very sensitive to being infected. The virus is contained in the saliva and can be easily spread to humans through licks or bites of infected animals. Preventative measures are immunisation of all cats, dogs and even cattle as well as reduction or elimination of the disease in wildlife reserves.

Typical symptoms for susceptible animals:

- Changes in the animal's behaviour;
- General sickness;
- Problems swallowing, e.g. a kudu standing in water without drinking;
- An increase in drool or saliva;
- Wild animals appearing abnormally tame (kudu, jackal) or aggressive (wild cats);

- Animals biting at anything when excited;
- Difficulty moving or progressive paralysis; and
- Death (Inform the state veterinarian immediately).

A general guideline is that any abnormal behaviour in animals could be indicative of rabies!

4.3.1.4 *Brucellosis (Afr. "Besmetlike misgeboorte")*

Brucellosis is a notifiable contagious disease which can also affect humans and is caused by different *Brucella* species. Clinical signs are difficult to observe in wild animals. Indications of the disease may be low lambing and calving percentages and an abundance of foetuses found in the field. If foetuses are detected in the field, they must be burned immediately and the nearest state veterinarian must be informed.

4.3.1.5 *Malignant Catarrhal Fever (Afr. "Snotsiekte")*

Malignant catarrhal fever is a notifiable viral disease (*gamma herpes virus*), which does not only affect cattle but also wild ruminants. The carrier species (wildebeest, red hartebeest, goats, sheep) stay asymptomatic. Clinical signs include inflammation of the mouth, nostrils and eyes as well as enlarged lymph nodes. The virus is susceptible to common disinfectants. Sunlight destroys the virus as well. The disease can be prevented and controlled by separating infected and carrier animals from susceptible species.

4.3.1.6 *Botulism (Afr. "Lamsiekte")*

The toxin produced by the bacterium *Clostridium botulinum* causes botulism. The clostridia spores are found in soil and are very resistant to heat, light, drying and radiation. Specific conditions such as the anaerobic rotting of carcasses, warmth and slight alkalinity are required for the germination of spores. Some clinical signs include progressive ataxia, recumbence and the head turned into the flanks. No treatment of diseased animals is possible. Control measures include attention to dietary deficiencies, disposal of carcasses and old bones in the field.

4.3.2 **Pathological conditions**

4.3.2.1 *Peritonitis (Afr. "Buikvliesontsteking")*

This is an infection/inflammation of the membrane of the abdomen. It might only be red or pieces of pus or adhesions may be visible between the visceral organs. If the whole carcass is affected (check the lymph nodes), then the whole carcass should be condemned.

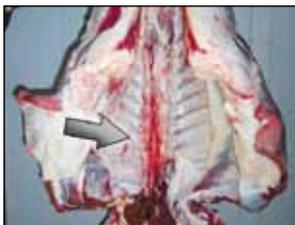
4.3.2.2 *Pneumonia/Pleuritis/Pleuropneumonia (Afr. "Longonsteking")*

The infection of the lungs may not necessarily cause clinical signs. Pneumonia (inflammation

of the lung tissue) often goes unnoticed up to the slaughter point. This is the result of the huge capacity of the lungs which can tolerate medium levels of pneumonia under normal circumstances. If pneumonia extends to the pleura (thin membrane of the chest wall), then it is called pleuropneumonia. Some bacteria can cause pleuritis, which is an inflammation in the early stage of lung infection.



Pus contamination on thorax
(Source: MY Hemberger)



Pleuritis
(Source: MY Hemberger)



Pus running down kidney
(Source: MY Hemberger)

4.3.2.3 Endoparasites (internal parasites)

Endoparasites play an important role in the livestock and game industry in Namibia. If game is kept within its natural environment and not alongside livestock, then the incidence of endoparasites is very low and the endoparasites then live in a biological balance with the host. However, when the game is in a poor condition (however good the grazing) it may be heavily infected with endoparasites. A faecal examination under the microscope might be helpful for further investigations. The most common endoparasites found in game species are nematodes (roundworm, Afr. "rondewurm"), cestodes (tapeworm, Afr. "lintwurm"), trematodes (flukes, Afr. "slakwurm, lewerslak").

- Nematodes

Different roundworm species are found in various parts of the body, but they exist mainly in the stomachs and intestines. In younger, older and weak animals they may cause anaemia, gastro-enteritis with diarrhoea, and may damage the organs. Such animals are unfit for human consumption and should be condemned. Some can be recognised with the eye, but others are only visible under the microscope. Abscesses and larvae from nodular worms (Afr. "knoppieswurm") are visible in the colon as small nodules. Other roundworms are visible in the faeces, stomachs or intestines when opened.

Larvae abscess - nodular worms
(Source: Mehlhorn et al.)



- Cestodes

Measles is the immature, infective stage of the tapeworm. Two stages occur – adult worms are found in the liver or intestines while the immature worms are found in various organs and the muscles. In the immature stage worms are found in the intestines of humans and predators. Eggs are excreted with faeces into the grass and the animals becomes infested if they graze in the same area. Eggs hatch and the larvae break through the intestinal wall and attach to connective tissue between muscles. A carcass with measles is aesthetically unacceptable and might infect humans. Such a carcass is thus not fit for human consumption.

Cysticercosis (tapeworm cysts) is a condition caused by the presence of the larval form of the tape worm *Taenia saginata* in the carcass tissue. Beef, pork or sheep carcasses affected with cysticercosis will contain live, dead or degenerated cysts in the heart, tongue, oesophagus or muscles. The live cyst will appear as a vesicle or small balloon filled with fluid. In most cases the cyst will be dead and degenerated to some extent and will appear as small infections or hard, thick tissue. The muscle tissue may also be watery or discoloured.



LEFT: Measles - Cysts
(Source: Zettl & Brömel)

RIGHT: Tapeworms
(Source: Mehlhorn et al.)



Sarcocystosis is caused by specific protozoa which are considered not pathogenic for humans. Their similarity to measles is, however, worth mentioning. Inspectors may detect lesions in the oesophagus first which are white, semi-oval, cigar shaped or rice-grain shaped. Lesions may also be detected in the diaphragm, skin muscles and internal (abdominal) muscles, or in the muscles between the ribs. Once primal cuts are produced, lesions can be observed in the skeletal muscles.

- Trematodes

Infestation with these parasites is found predominantly in the northern areas of Namibia. They can be found in the rumen or in the liver and bile ducts of the animal which can seriously affect the health of the animal.

4.3.2.4 Ectoparasites (external parasites)

- Ticks (Afr. "bosluise")

Game might carry various species of ticks, depending on the tick population in the field and the season of the year. Under normal circumstances the health of the animal is not affected. Careful dressing at the game handling facility will prevent contamination of the de-skinned carcasses. It is usually only weak individual animals which are affected that show signs of anaemia and weight loss. These animals will also have an abnormally high tick infestation and the carcasses are normally condemned, not because of the ticks but because of their emaciated state.

- Blue lice (Afr. blouluisse)

There are few cases of high infestations with blue lice (*Lignonatus* spp.) on springbok populations in designated areas. The grazing in these areas is usually poor and most animals are weak and anaemic. Animals with high infestations of blue lice should not be harvested.

4.4 Verification of game numbers and terrain

Officials of the Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism) determine the number of game which may be hunted on private ranches based on an annual visit where the size of the ranch, the vegetation and an estimation of game numbers are taken into consideration. From the data collected, the off-take percentage of game is then calculated for that particular ranch. The game rancher and leader of the harvesting team must ensure that adequate numbers of game are available on the farm before the harvesting operation commences. The game harvesting team should also familiarise themselves with the suitability of the terrain where the harvesting operation will take place. Filling a refrigeration vehicle with shot game carcasses within twenty-four (24) hours will largely depend on the suitability of the terrain.

4.5 Checks on potability of water

The harvesting team must ensure that all water used for the harvesting operation is potable (European Union Council Directive 98/83/EC) to prevent the surface of the carcass being contaminated with biological, chemical or physical hazards found in the water. Water from the sources used in the harvesting operation should be tested for spoilage and pathogenic bacteria.



Hartebeest (Source: Agriforum)

It is usually the game harvesting team who is responsible for setting up the field abattoir. However, it can also be an independent operation contracted by the harvesting team to eviscerate shot game.

5.1 Location

The field abattoir should be constructed in an area where the terrain is flat and where exposure to wind, dust and soil is at its minimum. It should also be as close as possible to where the game is harvested so that travelling unnecessarily long distances to the point of evisceration and/or refrigeration can be avoided.

5.2 Equipment

The field abattoir must comply with the following:

- A hanging frame should be available that is high enough to prevent the head or neck of the carcass from coming into contact with the ground;
- A system must be in place to prevent the accumulation of blood and waste products, dust or mud; and
- A separate space must be provided a few metres away from the frame for the inspection of the white offal (stomachs and intestines);

- Adequate hooks must be provided for the inspection of heads and feet well as for red offal;
- Sufficient sealable containers that comply with regulatory requirements must be provided for –
 - white offal;
 - inedible material; and
 - condemned material.
- Plastic bags or netting must be available for the red offal to be packed and be attached to the carcass from which it originated;
- Corrosion-resistant holders must be used for sterilising all knives and abattoir equipment. Steriliser holders must be rinsed after every shift or during the shift when necessary. A new shift usually commences when a fresh load of shot game enters the field abattoir.



Clean field abattoir structures (Source: Koës Harvesting Team)

5.3 Lighting

Artificial light must be provided at the depot/field abattoir with a minimum light intensity of 220 Lux for dressing and 540 Lux at the inspection point.

5.4 Water

Potable water and facilities must be provided for the sterilising of knives and equipment at a minimum of 82°C or a chemical sterilisation as approved by the veterinary authority.

Hands and equipment must be washed with warm running water at 42-45°C, or with potable water with an acceptable food grade approved disinfectant added.



Custom-made wash basin for hands and knives (Source: Koës Harvesting Team)

5.5 Hygiene

Food grade liquid bactericidal soap must be provided. Hand-drying facilities are necessary and for this purpose disposable paper towels can be used. Toilet facilities with soap and toilet paper must be provided.

5.6 Pre-operational cleaning and sanitation

Chemical detergents (cleaners) and sanitisers used to clean vehicles and equipment should be approved by the veterinarian overseeing the game harvesting operation.

5.6.1 Harvesting vehicles and equipment

- At least one hour before the harvesting operation commences, vehicles must be thoroughly washed and sanitised as follows:
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;
 - Rinse away detergent and loosened soil with warm water;

- Inspect for effectiveness of cleaning and re-clean if necessary; and
- Care must be taken not to leave any dirt or soil behind.



Washing of harvesting vehicle (Source: Koës Harvesting Team)

- The field abattoir manager ensures that the processing areas on all vehicles are free of equipment not used in the harvesting operation.
- If such equipment is stored in the processing area, it should –
 - not present a risk to the product ;
 - be carried in a manner that does not create an area for build-up of dust or bacteria that may present a risk; and
 - be cleaned before being loaded onto the vehicle.
- At least one hour before the harvesting operation commences, all equipment must be thoroughly washed, brushed and sanitised as follows:
 - Disconnect power to equipment. Where necessary, protect electrical connections and sensitive parts of equipment from water;
 - Dismantle equipment if necessary for proper cleaning. Parts are placed in designated containers, racks, or areas;
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;
 - Rinse away detergent and loosened soil with warm water;
 - Inspect for effectiveness of cleaning and re-clean if necessary; and
 - Apply approved chemical sanitiser to product contact surfaces (10 ppm free chlorine).

5.6.2 Field abattoir and equipment

- At least one hour before the harvesting operation commences, all structures and equipment must be thoroughly washed, brushed and sterilised as follows:
 - Disconnect power to equipment. Where necessary, protect electrical connections and sensitive parts of equipment from water;
 - Dismantle equipment if necessary for proper cleaning. Parts are placed in designated containers, racks, or areas;
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;
 - Rinse away detergent and loosened soil with warm water;
 - Inspect for effectiveness of cleaning and re-clean if necessary;
 - Care must be taken not to leave any dirt or soil behind; and
 - After washing, the structures and large equipment may be disinfected with 5% sodium carbonate (soda ash, washing soda).

5.7 Dress code for workers

Workers should wear outer garments which are suitable for the harvesting operation in such a manner that it prevents the contamination of meat and meat contact surfaces in order to ensure the safety of the product.

5.7.1 Dress code for harvesters

- Warm underclothes (night temperatures are low – especially in winter) ;
- PVC shoot (protection against cold, wind, etc.);
- Clean overalls (to prevent underclothes from getting into contact with carcasses);
- Rubber boots (to protect clothes and feet from blood, dirt, etc., easy to clean);
- Hair (and beard) net (to prevent hair from falling onto carcasses) and hard hat (to prevent head injuries); and
- Rubber aprons (to protect clothes from blood, dirt, etc., easy to clean).

5.7.2 Dress code for field abattoir workers

- Warm underclothes (night temperatures are low – especially in winter) ;
- PVC shoot (to protect against cold, wind, etc.);
- Clean overalls (to prevent underclothes from getting into contact with carcasses);

- Rubber boots (to protect clothes and feet from blood, dirt, etc., easy to clean);
- Hair net (to prevent hair from falling onto carcasses) and hard hat (to prevent head injuries);
- Rubber aprons (to protect clothes from blood, dirt, etc., easy to clean);
- Arm guards (to prevent open skin from getting into contact with carcasses, easy to clean).



Dress code for workers (Source: Mos-Mar Harvesting Team)

5.8 Hygiene code of conduct for workers

Workers should be properly trained in hygiene and sanitation. Personal cleanliness must be maintained at all times. Hands should be thoroughly washed and sanitised before starting work and before beginning a specific work procedure. All jewellery and unsecured objects are to be removed before the harvesting operations commence. If gloves are used it must be intact and clean. Cotton gloves can be worn for warmth – however, they should be covered by latex or plastic gloves to prevent contamination.

Clothing and personal belongings are not allowed to be stored where meat may be exposed or where carcass surfaces may be contaminated. Eating food, drinking beverages and chewing gum are not permitted where carcasses may be exposed or where carcass surfaces may be contaminated. The use of tobacco, and liquor is not permitted where food products may be exposed, or where food contact surfaces may be contaminated.



Kudu (Source: Agriforum)

6.1 Animal health and welfare during harvesting

If an animal is under stress when harvested, the quality and shelflife of the meat will be negatively affected. The meat of stressed animals may discolour. Blood supply to the muscles is increased and this can result in poor bleeding and meat that is not tender. Only game which passed the *ante-mortem* inspection (see 4.2) and that is seemingly alert may be shot. Shooting must be done so as to cause immediate death.

6.2 Mitigation on off-road driving

Care must be taken by the harvesting team not to damage the appearance of the environment while driving through the area earmarked for harvesting. Whenever possible, existing roads should be used to harvest the game. Drivers of harvesting vehicles should avoid the unnecessary destruction of plants, bushes and field features.



Mitigation on off-road driving

(Source: Mos-Mar Harvesting Team)

6.3 Shooting skills and exsanguination

The main objectives of commercial harvesting teams are to –

- deliver partially dressed game carcasses from uninjured, unsoiled and unstressed animals to the game meat handling facility; and
- apply good hunting techniques to avoid financial losses.

The harvesting of game for commercial purposes may only be done by a competent marksman (hunter). Only head or upper neck shots are allowed as they result in instantaneous death. No abdominal shots are allowed for export purposes. Abdominal shots will result in a carcass being contaminated with intestinal or ruminal content. Thoracic shots will lead to excessive bleeding, resulting in a carcass contaminated with blood.



Marksman with rifle (Source: Mos-Mar Harvesting Team)

Game may be shot with the aid of a shooting lamp (spotlight) of at least 55 watts which can concentrate its light efficiently up to a distance of at least 200 metres. The hunting rifle must adhere to the standards set out in Article 42 of the Namibian Nature Conservation Ordinance no. 4 of 1975. The bullet must not be solid and must have the energy at the muzzle of the rifle of no less than 2700 Joules for kudu, gemsbok, Hartmann's zebra and red hartebeest, or 1350 Joules for springbok.

The harvesting team should reach the dead animal as quickly as possible. Game intended for commercial purposes must be bled within 10 minutes of being shot. The animal is exsanguinated by cutting the skin with a clean, sterilised knife and then severing the jugular vein and carotid artery on either side of the neck (throat slitting) with a second clean sterilised knife. Care must be taken that all blood vessels in the neck are severed. Complete bleeding seldom occurs in game as the heart stops pumping after shooting and does not facilitate the bleeding process. The Game Meat Examiner must verify that animals are properly bled.

The different categories of game must be bled in the following ways:

- Category B (medium animals) on a ramp at a minimum slope of 20°;
- Category C (small animals) in a hanging position.



Neck slit (Source: Mos-Mar Harvesting Team)

The knife used for bleeding must be washed and sterilised before each cut. Large numbers of bacteria are found on the skin of any animal and contaminate knives when cutting through the skin. A system for sterilising the knives should be available. Ideal would be water at a minimum of 82°C, but since this is sometimes not practical, an approved chemical steriliser in an enclosed holder which is fitted to the harvesting vehicle should be used instead. When large numbers of game are harvested several knives should be used to prevent cross-contamination between carcasses. A two-colour knife system is often recommended to ensure the effective sterilisation of the knife not in use. Workers bleeding the game must wash their hands after each carcass with bactericidal (food grade approved) soap and potable warm water (42-45°C).



Steriliser for knives (Source: Mos-Mar Harvesting Team)

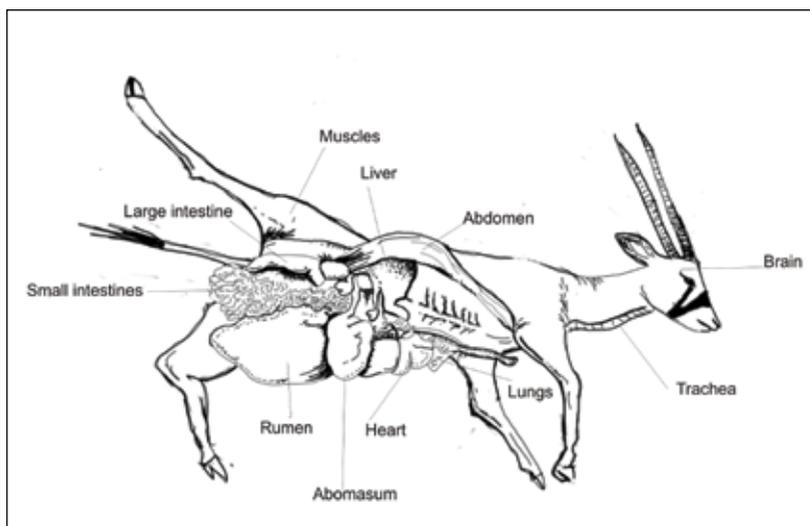
The Game Meat Examiner should observe, palpate and smell the following carefully:

- Efficiency of bleeding;
- State of nutrition of the animal (cachexia, emaciation (Afr. "uittering", etc.));
- Colour of the mucosa (see 4.3 & 6.3) ;
- Odour (uraemia – due to Nephritis (Afr. "nierontsteking"));
- Symmetry (old and new fractures);
- Abscesses, pus (peritonitis, metritis (Afr. "etter")) – (see 4.3.2.1);
- Parasitic conditions (see 4.3.2.3);
- Swollen lymph nodes;
- Bruising and injuries;
- Abnormalities on muscles, bones, tendons, joints (blood, abdominal shots, foreign bodies);
- Tumours (Afr. "gewasse"), carcinoma, sarcoma, melanoma.

Wounded animals requiring a second shot must be condemned if a time period of 10 minutes is exceeded after the first shooting. All suspect animals, including those that have been wounded, must be identified and clearly marked. Detained carcasses can either be

totally condemned or passed conditionally (sold for non-export purposes). Suspect carcasses must be separated or fully covered in plastic when transported to the export abattoir for examination by the state veterinarian. On the Suspect Carcass Form, which must accompany the consignment to the game handling facility, the following should be indicated by the Game Meat Examiner:

- Species, age, gender and weight of game animal;
- Part of carcass affected;
- Possible cause of detention; and
- Additional observation made during hunting.



Anatomy of game (Source: J. du P. Bothma)

This information must be provided in writing to a veterinarian or registered veterinary inspector at the first official inspection point which is usually at the game meat export handling facility/processing plant.

6.4 Marking and registration of carcasses for sites of origin

The traceability of products intended for incorporation into the food chain must be established at all production, processing and distribution stages (South African Veterinary Procedural Notice VPN/09 and European Commission Regulation 178/2002). This needs to be done to protect consumers and provide a basis for consumers to make informed decisions in relation to the foods they consume.

Immediately after being shot game meat animals should be adequately labelled and identified indicating the site of origin. Carcasses can be tagged on the leg. On the harvesting report (Afr. "skietlys") the following information should be recorded:

- Date and time of harvesting;
- Site of origin;
- Species, age, gender and identification number of game shot;
- Lactating females/females in gestation or not;
- Placement of shots (head, neck, body);
- Make and registration number of harvesting vehicle;
- The odometer reading of the vehicle;
- Name of marksmen;
- Calibre of firearm used by the marksmen; and
- Number of rounds fired by the marksman.



Burchell's zebra (Source: D de Bod)



Eland (Source: Mos-Mar Harvesting Team)

7.1 Requirements for the harvesting vehicle

Vehicles used to transport partially dressed harvested game carcasses from the point of kill to the field abattoir, must be constructed according to the category of game being handled. Game must be transported and reach the field abattoir within two (2) hours of being harvested. The neck slit area must not be contaminated (dirt, dust) when transporting the carcass to the field abattoir.

Vehicles used for harvesting Category C (small game – Namibian and South African category) game or springbok (considered large game by the EU) must be –

- designed with a corrosion-resistant hanging frame to bleed carcasses in a hanging position;
- designed to provide sufficient space (no heaping) between carcasses to allow effective air flow for cooling;
- corrosion-resistant and free from holes and cracks;
- durable, non-toxic, smooth-surfaced and impervious;
- resistant to impact;
- easy to clean;
- free from equipment or loose objects, other than what is required for the harvesting of game; and
- designed in such a manner that the animal's feet do not touch the ground while in transit.

Vehicles used for the harvesting of Category B (medium) game must –

- comply with the requirements above; and
- have a hoist and a ramp manufactured at a minimum slope of 20° for hanging game.



Hanging frame for small game (Source: Mos-Mar Harvesting Team)

7.2 Options for the evisceration of white offal

Harvesters should at all times aim to avoid contamination at the point of harvesting. If the field abattoir is close by and reachable within half an hour (30 minutes), it is recommended



Hanging slope for medium game (Source: Mos-Mar Harvesting Team)



*Evisceration of white offal in field
(Source: Mos-Mar Harvesting Team)*

that the white offal of shot game be eviscerated at the field abattoir where proper lighting is available. However, if the field abattoir is not close by, the white offal should be eviscerated on the spot. If the white offal is earmarked for human consumption, clean plastic sheeting should be placed underneath the white offal when eviscerating.

7.3 Hygiene management during evisceration

If the white offal is eviscerated in the field, hand-wash facilities must be available with potable warm water (42-45°C) and bactericidal (food grade approved) soap. A different coloured two-knife system should be in use to ensure that each animal is eviscerated with a clean, sterilised knife. A system for sterilising the knives should be available. An approved chemical steriliser in a holder should be available nearby to ensure effective sterilisation of the knives.

7.4 Procedure for evisceration procedure of white offal

Evisceration of the white offal is done as soon as possible, normally within thirty (30) minutes after killing, or before the bloating of the animal. In case of large game, this may be done soon after bleeding to reduce the carrying load of the vehicle. Game is normally eviscerated prior to skinning because the skin protects the meat during transportation. Dusty animals must be brushed before evisceration.

Opening incision lines on the stomach must be made with a clean, sterilised knife from the inside to the outside only (spear cuts). Game animals should preferably be in a hanging position when eviscerated, but this is not always practical. The opening incision must be

as short as possible. The longer the incision, the larger the area where contamination can occur. No hollow organs inside the carcass should be pierced/cut, since this can result in faecal contamination. These organs contain bacteria (e.g. *Salmonella* and *E. coli*) which can contaminate the inside and outside of the carcass. Care must also be taken not to break knife blades - therefore knife blades must be checked after every incision.

Once the incision has been made with a sterilised knife, clean hands are used to pull out the stomach and intestines utilising the following procedure:

- Reach into the abdominal cavity, cut the omentum loose and put it in a container;
- Loosen the intestines, reproductive organs and the bladder. Kidneys and kidney fat must stay in the carcass;
- Loosen the rumen and sever it from the oesophagus where it passes through the diaphragm;
- The rectum should be carefully “milked” before the intestines are cut loose, tied with a knot, or closed with a stapler pin, to avoid contamination;
- The stomach will then easily drop from the carcass. If the above procedure cannot be accomplished, the stomachs and intestines can also be removed as a whole.



Spear cut
(Source: Wildbret-hygiene hunters org. Austria)

The intestines are normally left in the field. However, when the intestines are kept for human consumption on the farm or elsewhere, it must be transported separately to the field abattoir for inspection by the Game Meat Examiner. Correlation between carcasses and intestines must be maintained. Contaminated surfaces on the partially eviscerated carcasses cannot be cleaned by washing and should be left as such. These surfaces will be cut away later to remove contamination.



Gemsbok (Source: GTZ)

Carcasses off-loaded at a field abattoir must not be flayed or de-skinned and are therefore eviscerated with the skin on with special hygiene procedures to prevent contamination from the skin being carried to the inside of the carcass.

8.1 Off-loading of carcasses

Carcasses must be transferred from the collecting vehicle to a clean slaughter frame in such a manner as to avoid contamination or soiling. Where carcasses are eviscerated at the field abattoir and not at the point of killing, the viscera should be hygienically removed and stored in sealable containers. Dusty animals should be brushed prior to evisceration.

8.2 Sterilising of knives

Every cut must be made with a clean, sterilised knife. Knives should be kept in a corrosion-resistant container with potable water at 82-87°C, or with chemical sterilisation (1-2 ppm free chlorine), as approved by the veterinary authority. It is recommended that a two-knife system is used with different coloured knives to ensure that a different knife is used for every cut.



Chlorine meter (Source: Mos-Mar Harvesting Team)

8.3 Hand washing

Field abattoir workers must wash their hands thoroughly with warm water (42-45°C) and food grade bactericidal soap between the handling of carcasses. Hands must be dry before carcasses are handled.

8.4 Hygiene and sanitation

If many flies or blowflies are attracted to the field abattoir and cause a risk of contamination, the harvesting operation must be discontinued. During evisceration of a carcass, contact of the exposed meat with platforms, slaughter frames, ground surface, outer surface of the skin or hide or soiled equipment must be avoided at all times. Washing of partially dressed carcasses is not permitted. Accidental soiling or contamination must be cut off. No insecticide or antibiotic substance or any substance intended to inhibit the activity of insects or the development of bacterial growth may be applied to the carcass.

Continuous cleaning and sanitation should be practised throughout the evisceration process at the field abattoir (clean-as-you-go). Workers must continuously clean and sanitise with warm water (82-87°C) or chemical steriliser (1-2 ppm free chlorine) all hooks, knives, tools and other equipment used during evisceration to prevent contamination. The temperature and/or chlorine level of the water must be tested throughout the harvesting proc-

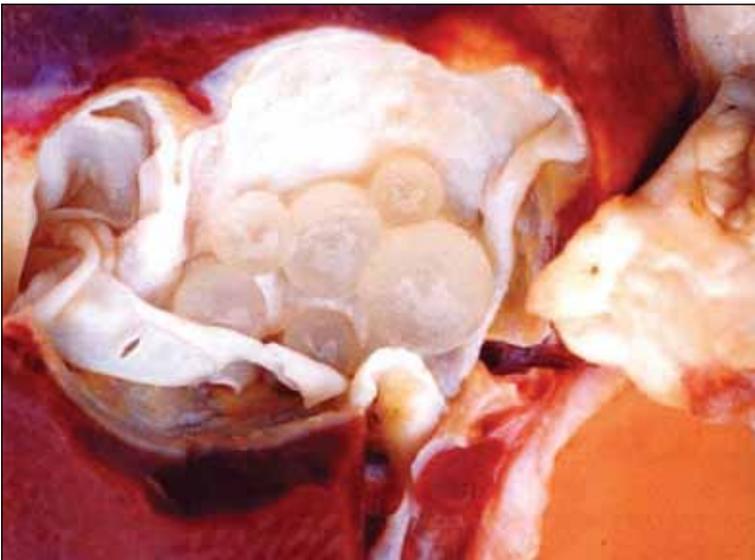
ess. The chemical data sheets of all detergents and sanitisers, as well as the dilutions and contact times thereof must be available at the site. If the floor surface becomes covered in blood and dirt it should be swept clean.

8.5 Inspection of the stomachs and intestines

The Game Meat Examiner should inspect the stomachs and intestines (white offal (Afr. "derms")) for the following (see 4.3 for more detail) :

- Tapeworms, measles (Afr. "lintwurm"), nodulars (Afr. "knoppieswurm") and other parasitic conditions;
- Metritis (infection in the uterus);
- Spleen (Afr. "milt") - it may be enlarged or coloured;
- Scrotal septicaemia (Afr. "balontsteking");
- Mastitis (Afr. "uierontsteking"); and
- Inflammation.

The abdominal cavity must be inspected after evisceration for swollen lymph nodes. A light brown lymph node is regarded as normal whereas a darker lymph node may be suspicious. Where pus (sign for peritonitis) is visible, the whole carcass must be condemned. If the abdominal cavity is contaminated with blood or faeces, the carcass will not qualify for commercial meat export.



Echinococcus cysts
(Source: Mehlhorn et al.)

8.6 Removal of front and back feet

Heads and feet may be removed at the field abattoir, provided that a first post-mortem inspection is done. The leg is sawn off just below the knee and the hock joints. The piece that is left is removed in the game export handling facility with the hide leaving a clean joint to cut through. Label the feet with the serial number of the carcass and place the feet in a designated container for inspection. If the feet are removed at the point of shooting to ease transport, the feet must be transported with the shot game on the same vehicle to the field abattoir for inspection. Correlation with the carcass should be kept at all times.

8.7 Removal of the head

Make an incision with a sterilised hand knife between the head and the first neck vertebra and sever the neck. It can help to cut a slit in the skin flap of the head to facilitate a hand grip while carrying the head. Hang the head by the lower jaw on a hook on the head rail. The tongue can be removed by severing the connective tissues and the tongue root at the base of the tongue. If the skin is left on the head, it will be treated as dirty offal, whereas if the head is de-skinned, it will be treated in the same way as red offal. The head and tongue must always be identifiable with the carcass until the meat inspection is done. Horns may be removed with part of the cranium and stored separately. In the case where the head and feet will be sold as edible offal, it must be stored in containers away from the ground.

8.8 Removal of reproductive organs and anus

Lactating udders are regarded as condemned material and should be removed with the skin on. To remove the testes, make an incision through the fat from the testes up to the thorax on the midline of the carcass. Make a small incision, pop the testes out of the scrotum and cut the penis off up to the navel. The anus must be cut loose with a sharp, sterilised knife.

A clean plastic bag is then fixed around the loosened anus and rectum with a rubber band (bunging) without damaging the muscles. Do not cut into the rectum – this may cause contamination or damage. These organs may not be utilised for meat production. It must be handled as condemned material and should be placed in designated containers. Game harvesters are advised to familiarise themselves with the techniques applied to remove condemned material. The nearest abattoir veterinarian can be contacted for the best advice in this regard.



Bunging (Source: Wildbret-hygiene hunters org. Austria)

8.9 Removal of the pluck (red offal)

The pluck (trachea, lungs, liver, heart) must be eviscerated from the harvested game in a hanging position only at the field abattoir. Adequate lighting should be provided to see into the rib cage. Make an incision with a sterilised knife through the fat and meat onto the bone of the sternum. Split the cartilage at the top of the breast bone. Pull the thoracic cavity open and cut the diaphragm loose on both sides. Push the liver to one side without puncturing the gall bladder. The pluck is then cut loose with a sterilised knife along the spine, the oesophagus and trachea are subsequently cut at the neck and all is pulled down and out of the thoracic cavity. The pluck is then placed on a hook for inspection. After visual inspection, the pluck must be placed in strong, clean plastic bags tied to the partially dressed carcasses carrying the corresponding serial number. The pluck must accompany the partially dressed carcass to the game export handling facility in a hanging position.



LEFT: Removal of red offal
(Source: Koës Harvesting Team)



RIGHT: Red offal in plastic bags
(Koës Harvesting Team)

8.10 First post-mortem inspection at the field abattoir

What is the purpose of the first post-mortem inspection? This is to make sure that the meat is fit for human consumption. It also oversees animal welfare during harvesting such as stress and bruising caused by poor harvesting techniques or contamination caused by faeces, blood or intestinal content. This process also eliminates disease and injuries which were not visible during the *ante-mortem* inspection. A full *post-mortem* inspection is carried out when the partially dressed game carcasses are off-loaded at the game processing facility,

Only Veterinary Inspectors or trained Game Meat Examiners may do first post-mortem inspections at the field abattoir. All relevant information including *ante-mortem* and health records must be taken into account when doing meat inspections. The Game Meat Examiner must inspect the carcass and viscera by observation, palpitation, smell, and if necessary, incision. A comprehensive first post-mortem inspection must be carried out on:

- Heads
 - Examine the mouth, tongue and throat for foreign bodies (wood tongue) and look at the lymph nodes of the tonsils and under the ears;
 - Visually inspect the skin, lips, gums, hard and soft palate and nostrils – look for aktinomycosis – a bacterial disease affecting bone tissue;
 - Inspect for any signs of foot-and-mouth disease (lesions on the mouth, skin, bone or hoofs);
 - Examine for any signs of rabies (foam around the mouth).
- Feet
 - Inspect visually for lesions that are septic with death and decomposition of a part of the body tissue (gangrene (Afr. “weefselvrot”), necrosis);
 - Examine for any signs of foot-and-mouth disease.
- Plucks

After removal of the plucks, the lungs must be visually inspected for –

 - pneumonia (Afr. “longontsteking”) and pericarditis (Afr. “hartsakontsteking”) which seldom occurs;
 - caeous content on lungs and in thoracic cavity due to pleuritis (Afr. “bors/ribvliesontsteking”) infection (easily visible);
 - lymph nodes [Determine whether the infection is general or localised (pyaemia (Afr. “etterinfeksie”), septicemia (Afr. “bloedvergiftiging”)];
- Reproductive organs and lactating udders;
- **No lymph nodes may be removed prior to the final veterinary inspection at the game handling/processing facility;**

- No person may remove any signs or evidence of any disease, condition, contamination or soiling by washing, trimming or any other manner prior to meat inspection.

8.11 Detained/suspect carcasses



Field abattoir in operation (Source: Koës Harvesting Team)

The Game Meat Examiner must detain all partially dressed carcasses in case of –

- thoracic shots resulting in contamination of the thoracic cavity with blood and/or bone splinters;
- gut shots resulting in contamination of abdominal cavity with faeces;
- signs that the game animals were wounded or required more than one shot to die;
- excessive contamination of abdominal cavity where game was eviscerated in the field with ingesta, faeces, soil, grass, mud, etc. resulting from poor eviscerating techniques;
- state of nutrition (cachexia, emaciation);
- mucosa (if nearly white – anaemia/protozoa/endoparasites, if more reddish – acute infection);
- parasitic infestations (cysts, tapeworms, measles);
- bruising and injuries;
- abnormalities of muscles, bones, tendons, joints or other tissues; and
- peritonitis (caesous content in abdominal cavity).

The Game Meat Examiner or Veterinarian on site at the field abattoir will determine whether a carcass is suspect and must be detained. Such carcasses may not be used for export of game meat and may not be loaded in refrigeration vehicles together with healthy carcasses. All details of suspect carcasses must be recorded.

Details required on the Suspect Carcass Checklist include the following:

- Date of harvesting;
- Species, gender, age and weight;
- Part of carcass affected;
- Possible cause of affection;
- Signature of the Game Meat Examiner/Veterinarian.

If the Game Meat Examiner is unavailable at the field abattoir to carry out the examination on the carcasses and organs, then the head, feet and all the viscera, except for the stomach and intestines, must accompany the body in separate, lockable and labelled containers.

8.12 Completion of harvesting documentation

Harvesters and field abattoir workers must ensure that all documents and checklists are filled in before ending the harvesting operation. Documents to be filled in comprise of the following:

- Game Harvesting Report (Afr. "skietlys");
- *Ante-mortem* Inspection Checklist;
- Record of detained/suspect carcasses;
- Checklist for workers' health and hygiene;
- Checklist for cleaning and sanitation (Pre-, continuous and post-operation);
- Checklist for compliance with work procedures;
- Game harvesting control document; and
- Corrective action request form.



Springbok (Source: Agriforum)

9.1 Refrigeration vehicle requirements

Refrigeration vehicles must comply with regulations pertaining to vehicles transporting meat. Hooks to hang the carcasses must be embedded in the roof of the vehicle. Where carcasses need to be kept in a refrigeration vehicle for an extended period of time, the following requirements must be followed:

- For exports to South Africa the refrigerator unit must have the potential to chill the carcasses to a temperature of below 7°C in 24 hours from being harvested (RSA Game Meat Manual, 2007). The refrigerator unit's setting should preferably be -2°C to achieve the desired carcass temperature.
- For exports to the European Union the carcasses must undergo a maturation period (Council Decision 79/542/EC) of 24 hours (inactivation of possibly undetected foot-and-mouth disease infection). The refrigerator unit's setting point must be above 2°C for at least twenty-four (24) hours. The inner core temperature of the carcasses must thereafter be maintained at between 4°C and 7°C until off-loading. The maturation period usually starts after the last carcass has been loaded into the refrigeration vehicle with the doors closed and sealed.



Hooks inside the refrigeration vehicle (Source: Koës Harvesting Team)

Keeping the temperature of the meat below 7°C is necessary to prevent bacterial growth that may lead to spoilage of the meat. The temperature within the refrigeration vehicle, as well as carcass inner core temperatures, must be measured before loading and at least twice during the loading of carcasses, if the refrigeration vehicle stays in the field for twenty-four (24) hours or longer. It is recommended that the harvesting team invest in computerised temperature data loggers which can monitor the temperature inside the refrigeration vehicle throughout the harvesting operation. The annual renewed calibration certificate of the refrigeration unit must always be available during the harvesting operation.

9.2 Hygienic loading of carcasses

The partially dressed game carcasses and the red offal must be loaded into a refrigeration vehicle within a reasonable period of time after killing (twelve (12) hours after being shot) if the ambient temperature is below 12°C. If above 12°C, the game carcasses must be chilled within four (4) hours. Workers loading carcasses into the refrigeration vehicle must wash their boots immediately adjacent to the vehicle and should not walk through the collection point and then carry dust and/or sand into the refrigeration vehicle. Workers must avoid heaping and ensure that there is sufficient air flow between the carcasses to ease cooling. Where mixed species are harvested, different species should be separated with strong, clean sheeting reaching from the top to the bottom, as well as from one side to the other side of the refrigeration vehicle.

9.3 Measurement of carcass pH

If a game animal is killed with minimal stress then there is a normal pH decline and the quality of the meat is good. This is why it is important to measure the pH of the meat. However, when the animal is killed after a running period, little glycogen is left in the muscles and the pH stays high. No lactic acid is formed and the meat is dark and dry. Meat with a high pH is also prone to bacterial spoilage. If the game animal runs for a very long period the liver cannot break down the lactic acid fast enough and lactic acid builds up in the muscle. This results in the denaturation of the muscle protein and the meat is pale, soft and watery. **Meat with a pH below 6.0 after twenty-four (24) hours is the acceptable norm.** A pH meter (with calibration certificate) should be available at the field abattoir to measure pH values.

9.4 Measurement of carcass temperature

A harvested animal's body temperature is $\pm 38^{\circ}\text{C}$. The removal of the intestines facilitates the cooling of the carcass. If the harvesting operation lasts more than twenty-four (24) hours, the Game Meat Examiner must ensure that the inner core temperature of the carcasses inside the refrigeration vehicle is below 7°C , by measuring the deep-bone temperature of the carcasses periodically. The calibration temperature of the thermometer must always be available during the harvesting operation.



Measuring carcass temperature (Source: Wildbret- hygiene hunters org. Austria)

Some factors influencing the cooling down of the carcass:

- The size of the carcass – a larger carcass takes longer to cool down and might cause a conflict with the maturation setting point of the refrigeration unit that is above 2°C (check carefully);
- The position of the carcass within the refrigeration vehicle – closer to the fan the carcasses cool down faster whilst those closer to the door cool down more slowly;
- The number of times that the door is opened and closed;
- Loading density (this will influence air flow in the truck);
- Loading rate; and
- Capacity of the refrigeration unit.



*Herd of
springbok,
Etosha
National
Park,
Namibia*

Springbok (Source: GTZ)



Gemsbok (Source: Mos-Mar Harvesting Team)

10.1 Transport of carcasses requirements

When all the partially dressed game carcasses are loaded into the refrigeration vehicle, the Game Meat Examiner must seal the vehicle with a seal containing an unique number. If a previous seal needs to be broken to load additional partially dressed game carcasses (maybe from another farm), the number of the broken seal as well as the new seal number must be noted on the Game Harvesting Control Document.

Maintaining the cold chain when transporting carcasses to the game meat handling facility / processing plant is of utmost importance. In case of mixing of warm and cold carcasses, the cold carcasses must be screened off with plastic sheeting/curtains. Ducts conveying the cold air from the refrigeration units must be constructed in such a way as to allow cold air to be distributed in all areas of the refrigeration vehicle. Sufficient space to allow for adequate air circulation must be kept between carcasses at all times. The hooks inside the refrigeration vehicle must be suitable for the type of game carcasses transported. All loads by refrigeration vehicle must be suitably protected against dust contamination en route. If necessary, back doors must be sealed with plastic and secured with masking tape.

Veterinary maturation of meat destined for the European market is necessary. This is a control process whereby the foot-and-mouth virus is deactivated. Carcasses must be submitted to maturation at a temperature above 2°C for at least 24 hours before de-boning. All carcasses subject to the maturation period should also have a pH of less than 6.0 and an inner carcass tempera-

ture of between 4°C and 7°C. Where edible rough offal is transported in the same load space as partially dressed carcasses it must be packed in separate sealable leak-proof containers. No live animal or person is allowed in the same cargo compartment as game carcasses.

10.2 Checking of documents accompanying consignment

All deliveries of partially dressed game carcasses to the game meat export handling facility must be accompanied by the necessary documents, filled in and signed by the respective responsible parties. The Game Meat Examiner must verify all documents and sign the checklists and reports. It is recommended that the documents of each harvest are copied for the safe-keeping at the game meat handling/processing establishment. The original documents can either be kept in the office of the game harvesting team or at the game meat handling facility/processing establishment. These documents include:

- Copy of Harvesting Programme and Notice of Harvesting given to the officials of the Directorate of Parks and Wildlife Management (Ministry of Environment and Tourism) and the Directorate of Veterinary Services (Ministry of Agriculture, Water and Forestry);
- *Ante-mortem* Health Declaration where applicable;
- Game Harvesting Report (Afr. "skietlys");
- Proof of qualification of the Game Meat Examiner ;
- Copy/copies of registration certificate(s) of harvester(s) with the Directorate of Parks and Wildlife Management and the Directorate of Veterinary Services;
- Health certificate(s) of harvester(s) as well as of assistants including copies of identity documents;
- Recording Form for Suspect Carcasses;
- Checklist for workers' health and hygiene;
- Checklist for cleaning and sanitation;
- Checklist for compliance with work procedures;
- Corrective Action Forms;
- Calibration certificates (refrigeration vehicle, thermometers, pH meters).



pH Meter (Source: Testo)

10.3 Off-loading of carcasses at game meat handling facility

The official veterinarian at the establishment/processing plant will verify that the seal is not broken, that the seal number corresponds with the seal number as indicated on the Game Harvesting Control Document and that the number of partially dressed game carcasses and their tag numbers concur with the information provided. The official veterinarian will also note the temperatures. Continuous thermocontrol recording is recommended from loading of the carcasses to arrival and unloading at the game meat handling facility. The recording must provide the accurate actual time and temperature analyses covering all phases of harvesting and transport.



Gemsbok (Source: D de Bod)

11.1 Post-operational cleaning and sanitation

11.1.1 Harvesting vehicles and equipment

- After the harvesting operation has ceased, vehicles must be thoroughly washed and sanitised as follows:
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;
 - Rinse away detergent and loosened soil with warm water;
 - Inspect for effectiveness of cleaning and re-clean if necessary;
 - Care must be taken not to leave any dirt or soil behind.
- After washing the vehicles should be disinfected with 5% sodium carbonate (soda ash, washing soda).
- Equipment must be thoroughly washed and sanitised as follows:
 - Disconnect power to equipment. Where necessary, protect electrical connections and sensitive parts of equipment from water;
 - Dismantle equipment if necessary for proper cleaning. Parts are placed in designated containers, racks, or areas;
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;

- Rinse away detergent and loosened soil with warm water;
- Inspect for effectiveness of cleaning – re-clean if necessary;
- Apply chemical sanitiser to product contact surfaces (10 ppm free chlorine).

11.1.2 *Field abattoir and equipment*

- All structures and equipment must be thoroughly washed, brushed and sterilised as follows:
 - Disconnect power to equipment. Where necessary, protect electrical connections and sensitive parts of equipment from water;
 - Dismantle equipment if necessary for proper cleaning. Parts are placed in designated containers, racks, or areas;
 - Remove large pieces of product and debris from surfaces to be cleaned;
 - Rinse surfaces with warm water;
 - Apply approved cleaner and scrub as needed to remove soil;
 - Rinse away detergent and loosened soil with warm water;
 - Inspect for effectiveness of cleaning and re-clean if necessary;
 - Care must be taken not to leave any dirt or soil behind;
 - After washing, the structures and large equipment should be disinfected with 5% sodium carbonate (soda ash, washing soda).

11.2 Regulations for removal and selling of by-products

No rough or red offal may be sold unless inspected and approved by a registered game meat inspector and declared fit for human consumption. Offal must be chilled within three (3) hours after the animal was shot.

No head, skin, feet or horns may be sold unless it has been inspected and approved by a registered game meat inspector. Skins are usually salted and dried before being sold to a skin processor to prevent spoilage by bacteria.

Trade of raw and processed game hides is controlled by the Nature Conservation Ordinance no. 5 of 1975 as amended in 1996. Export of game hides, in whatever format, requires a veterinary import and a Namibian export permit. The latter can be obtained from the Permit Office of the Ministry of Environment and Tourism (Tel. 061 - 284 2563 / 061 - 284 2539) at a fee of NS100.00 (2009). Trophy dealers can apply for a licence from the Ministry of Environment and Tourism at a fee of NS500.00 (2009) which is valid for a period of one year.

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Receipt nr: **MINISTRY OF ENVIRONMENT AND TOURISM****Directorate Scientific Services**

Channel Life Tower, Post Street Mall, City Centre

Private Bag 13306, Windhoek, NAMIBIA

Tel +264 61 2842111 Fax +264 61 258861

APPLICATION FOR REGISTRATION AS A NIGHTCULLING TEAM/NIGHTCULLING UNIT

Please indicate:

Keep at reception Mail Type of application (please tick /✓) Nightculling team (First application) Nightculling unit (First application) Renewal of registration

Details of applicant (preferably to be completed by team leader)

Name: _____

Identification number: _____

Postal address: _____

Tel: _____ Fax: _____

Signature: _____ Date: _____

(Applicable to nightculling units only)

FARM NAME	FARM NUMBER	DISTRICT

Please tick **First applications for teams/units:** Attach detailed list of team members and their responsibilities as well as equipment Attach list of new marksman to be tested Provide nightculling permit number in case of testingPermit nr. Proof of payment**Applications for renewal of an expired certificate:** Attach a copy of certificate Provide shooting lists Attach detailed list of team members and their responsibilities as well as equipment Attach proof of payment Provide nightculling report backs for units**Please ensure that your application is complete, prior to submitting it to the Permit Office/Regional MET office.**

**APPLICATION FOR REGISTRATION OF A CROPPING TEAM
FOR HARVESTING WILD GAME FOR EXPORT
(DIRECTORATE OF VETERINARY SERVICES)**

A: PARTICULARS OF HUNTER LEADER

Name of hunter:			
I.D. Number:			
Hunters licence (HL) no.:			
Postal address:			
Telephone:			
Fax:			
Cell number:			
E-Mail:			
Health certificate	Yes		No

B: PARTICULARS OF OTHER HUNTERS AND ASSISTANTS

Name	ID number or HL number	Health Certificate	
		Yes	No

C: PARTICULARS OF GAME MEAT EXAMINER.

Name and ID number:	Date GME certificate obtained:	Institution from which the GME certificate was obtained:

- i. I understand that failure to comply with any relevant legislation and additional requirements, my registration may be suspended or withdrawn and harvesting will be stopped.

_____ (Signature of Hunter)

Signed at (place) _____ (Date) _____

Stamp

_____ (Signature of Veterinary Authority or representative)

CHAPTER 12

RELEVANT CONTACT DETAILS



GOVERNMENT MINISTRIES

Ministry of Environment and Tourism Permit Office

Private Bag 13346, Windhoek, Namibia
Tel. 061 - 284 2541
Fax. 061 - 258 861

REGIONAL WILDLIFE OFFICES

Central (Windhoek)
Tel. 061 - 2842111 / Fax. 061 - 239506

North West (Outjo)
Tel. 067 - 313 436 / Fax. 067 - 313 593

Northern (Ongwediva)
Tel. 065 - 231 468 / Fax. 065 - 231 469

North East (Rundu)
Tel. 066 - 255 403 / Fax. 066 - 255 789

South (Keetmanshoop)
Tel. 063 - 223 223 / Fax. 063 - 223 955

West (Swakopmund)
Tel. 064 - 404 576 / Fax. 064 - 403 236

Ministry of Agriculture, Water and Forestry Directorate of Veterinary Services

Private Bag 13184, Windhoek, Namibia
Tel. 061 - 2087 509 / 061 - 208 7505
Fax. 061 - 208 7779

Regional State Veterinary Offices

Windhoek
Tel. 061 - 276 580 / Fax. 061 - 276 582
Okahandja

Tel. 062 - 501 151 / Fax. 062 - 502 591
Otjiwarongo

Tel. 067 - 302 131 / Fax. 067 - 302 978
Otavi

Tel. 067 - 234 085 / Fax. 067 - 234 363
Outjo

Tel. 067 - 313 050 / Fax. 067 - 313 480
Grootfontein

Tel. 067 - 242 000 / Fax. 067 - 243 389
Mariental

Tel. 063 - 242 171 / Fax. 063 - 242 578
Keetmanshoop

Tel. 063 - 223 003 / Fax. 063 - 223 190
Walvis Bay

Tel. 064 - 205 313 / Fax. 064 - 203 073

HARVESTING TEAMS

Bertus Pretorius Harvesting Team

P. O. Box 830, Gobabis, Namibia
Tel. 062 - 564 790
Cell. 081 214 8082
E-mail: sabo@mweb.com.na

Brink & van der Merwe Night Culling

P. O. Box 761, Keetmanshoop, Namibia
Tel. 063 - 222 889
Fax. 063 - 224 650
Cell. 081 229 5936
E-mail: johan.irene@yahoo.com

Koës Night Culling Team (Sinib Culling cc)

P. O. Box 110, Koës, Namibia
Tel. 063 - 252 641
E-mail: smith.swa@gmail.com

Mos-Mar Harvesting Team

P. O. Box 35105, Windhoek, Namibia
Cell: 081 242 5161
E-mail: leana@mweb.com.na

Nossob Night Culling

P. O. Box 6326, Windhoek, Namibia
Tel. 061 - 280 0450
Fax. 061 - 222 260
Cell. 081 129 1628 / 081 124 9140
E-mail: flikkersvdwest@gmail.com

Suidwes Harvesting Team

P. O. Box 40667, Ausspannplatz, Namibia
Cell. 081 127 5447 / 081 297 7093
E-mail: francois.m@mweb.com.na

NON-GOVERNMENTAL ORGANISATIONS / ASSOCIATIONS

Abattoir Association of Namibia

P. O. Box 428, Windhoek, Namibia
Tel. 061 - 267 700
Fax. 061 - 216 561
E-mail: info@hartlief.com.na

Namibia Nature Foundation

P. O. Box 245, Windhoek, Namibia

Tel. 061- 248 345

Fax. 061- 248 344

E-mail: sw@nnf.org.na

<http://www.nnf.org.na>

Namibia Professional Hunters Association

P. O. Box 11292, Windhoek, Namibia
Tel. 061 - 234 455
Fax. 061 - 222 567
E-mail: ceo@napha.com.na
<http://www.napha.com.na>

World Wildlife Fund

P. O. Box 9681, Windhoek, Namibia
Tel. 061 - 239 945
Fax. 061 - 239 799
E-mail: gstuart@mweb.com.na
<http://worldwildlife.org>

GAME HANDLING FACILITIES/PROCESSING FACILITIES

Brukarros Meat Processors

P. O. Box 1801, Keetmanshoop, Namibia
Tel. 063 - 228 800
Fax. 063 - 228 820
E-mail: kabols@bmp.com.na

Closwa Biltong

P. O. Box 564, Okahandja, Namibia
Tel. 062 - 501 123
Fax. 062 - 501 593
E-mail: closwa@iafrica.com.na

Farmers Meat Market Ltd.

P. O. Box 50013, Windhoek, Namibia
Tel. 061 - 230 698
Fax. 061 - 230 701
E-mail: thorn@fmm.com.na

FOOD SAFETY CONSULTANTS

FoodChainSolutions (Namibia)

P. O. Box 11774, Windhoek, Namibia
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