



Slaughter conditions to optimise chevon meat quality

10/26/2018

Determination of slaughter conditions to optimise chevon visual and eating quality

Industry Sector: Cattle And Small Stock

Research Focus Area: Animal Products, Quality And Value-Adding

Research Institute: Agricultural Research Council – Animal Production Institute

Researcher: Dr L Frylinck PhD

The Research Team

Title	Initials	Surname	Highest Qualification
Prof	PE	Strydom	PhD

Prof	EC	Webb	PhD Animal Science
Dr	P	Pophiwa	PhD Animal Science
Prof	LC	Hoffman	PhD Animal Science
Ms	GL	van Wyk	MSc (Registered for PhD)
Ms	JD	Snyman	ND Histologie

Year Of Completion : 2018

Aims Of The Project

- To determine the expression of genomic markers in five South African purebred genotypes – Bos indicus
- To determine the optimum slaughter procedures (electrical stimulation for 15 – 60 seconds or delayed/step wise chilling – time determined by optimal pH) for carcasses from castrated and intact male goats of two breed types: Boer Goats and Indigenous Veld Goats (IVG, Eastern Cape Xhosa or Northern Cape Speckled Goats)
- To evaluate the tenderness and connective tissue characteristics in six different muscles m. longissimus thoracis et longissimus (LTL), m. semimenbranosus (SM), biceps femoris (BF), supra spinatus (SS), infra spinatus (IS) and semitendanosus (ST) in electrical stimulated carcasses of Boer Goats and IVG from castrated and intact male goats.

- To evaluate the tenderness and calpain system ageing related characteristics in m. longissimus thoracis et lumborum (LTL) and m. semimembranosus (SM) muscles of electrical stimulated and non-stimulated carcasses of Boer Goats and IVG from castrated and intact male goats.
- To evaluate sensory attributes and other meat quality characteristics of chevon from the respective post-slaughter treatments in m. longissimus thoracis et lumborum (LTL) and m. semimembranosus (SM) muscles of electrical stimulated and non-stimulated carcasses of the two breed types; Boer Goats and IVG from castrated and intact male goats.

Executive Summary

The demand for goat meat in South Africa is relatively low because of traditional perceptions of off smells, off flavours and expected toughness. Perceptions also exist that Indigenous Veld Goat (IGV) produce tougher meat than Boer Goat (BG) specially bred to be a meat producing breed. The name indigenous goat is perceived as being small and not suitable for meat production. It is now discovered that some Indigenous Eco-types of Southern Africa, compare well with the Boer goat in size, can also produce good meat products if good farming and rearing practices are followed. Except for the advantage to preserve the indigenous breeds for the future generations, these breeds are well adapted to the harsh climate conditions in Southern Africa and are hardy with minimum need for veterinary intervention. Production and slaughter procedures should be adapted to suit the characteristics such as the low glycolytic potential and low carcass fat of goat carcasses. There is therefore a need to optimise the pre- and post-slaughter procedures in order to optimise the chevon (goat meat) visual and eating quality.

The first aim were investigated by applying different pre- and post slaughter procedures such as castration or not, applying electrical stimulation for 20 and 30 seconds or apply stepwise chilling. The monitoring of the muscle pH and temperature, muscle energy, meat colour and tenderness showed that either controlled step wise chilling or electrical stimulation of at least 30 sec will prevent cold toughening and produce ideal conditions for the intra muscular proteolytic enzymes to optimally function. It was found that castrated animals produced more tender meat than intact carcasses, but that more subcutaneous fat were produced, which could be advantageous to its eating experience. Both breed types: Boer Goats and Indigenous Veld Goats (IVG, Eastern Cape Xhosa or Northern Cape Speckled Goats, showed the same advantage in tenderness and colour if slaughter conditions were optimised.

The intrinsic characteristics of the six different muscles m. longissimus (LTL), m. semimembranosus (SM), biceps femoris (BF), supra spinatus (SS), infra spinatus (IS) and semitendinosus (ST) differed from each other as expected, but castrated muscles had an higher intramuscular fat content – up to 4% than that on intact carcasses – similar in both breed-types tested. Percentage collagen solubility did not differ between the different muscles, but the total collagen measured in each muscle type did differ. Thus is optimal cooking method important.

Evaluating the tenderness and calpain system ageing related characteristics in m. longissimus thoracis et lumborum (LTL) and m. semimembranosus (SM) muscles of electrical stimulated and non-stimulated carcasses of Boer Goats and IVG from castrated and intact male goats confirm that the breed types did not differ in tenderness, but castration do have an advantageous effect on tenderness. It is said for beef that sarcomere length (SL) longer than 1.7 μm does not influence tenderness, but in this project it was obvious that the shorter 1.8 μm sarcomere length compared to that of our first subproject of 2 μm could have influenced meat tenderness. It is said that the calpain system works more effectively when the SL length is longer.

Sensory panel evaluation showed attributes and other meat quality characteristics of chevon from the respective post-slaughter treatments in m. longissimus (LTL) and m. semimembranosus (SM) muscles of electrical stimulated and non-stimulated carcasses of the two breed types; Boer Goats and IVG from castrated and intact male goats. Overall it seems like the sensory panel found the LTL and SM muscles tough, although the shear force measurements was not exactly inline with their findings. As mentioned before, the slaughter conditions could have been chosen better, for instance the ES should have been 30 sec and not 20 sec. Delayed/stepwise chilling could have given better results. I do recommend though that if a future sensory panel study is being done, mutton should be included to remove the possibility of biasness. Although I have no reason to doubt the professionalism of the panel, I do think that there could be a possibility of a negativity towards goat meat.

The evaluation of carcass characteristics and yield of electrical stimulated and non-stimulated carcasses of the two breed types; Boer Goats and IVG from castrated and intact male goats (additional aim) showed more differences between castrated and non-castrated carcasses than between carcasses of the two breed types. The dressing percentages did not differ between the castrated breeds, but was a bit higher than that of the intact carcasses. There was no significant differences in the percentage meat yield

between breeds, although the different commercial cuts could differ a bit in sizes, mainly because of different ratios and form of different parts of the carcass that is genotypic-ally expected.

From this project a better understanding is formed on how goat temperament differ from other farm animals, that pre and post slaughter conditions must be adapted to take their unique characteristics into account. A small change in slaughter practice can have a mayor impact on the end product. Information acquired from these and future research should be disseminated to the farmers, producers and specific abattoirs that apply to special slaughter facilities and management for chevon production.

.Development of the market for chevon in South Africa would offer more diversity of species for red meat producers and especially benefit emerging farmers who produce over 90% of the goats in South Africa. There are good indications that goats can yield chevon or kid of acceptable quality to consumers, providing that animals of an appropriate age and sex group are slaughtered, handled and fed well during production and slaughter so as to minimise stress and prevent cold shortening.

Popular Article

Karkaskwaliteit/Opbrengs Van Intakte En Gekastreerde Boerbok En Groot Raam Inheemse Eco-Tiepe Veld Bokke (Sg. Noord-Kaap Spikkel En Oos-Kaap Xhosa (IVB) Bokke)

Dr Lorinda Frylinck, Senior Navorsers, LNR-Diere Produksie, Irene.

Veertig gespeende Boer en veertig IVB bokkies, waarvan 20 elk gekastreerde en intakte rammetjies was is in die krale van die Landbounavorsingsraad-Diere Produksie, Irene grootgemaak. Hulle is dieselfde dieet gevoer nl. “Ram, Lam en Ooi” pille, lucerne, hooi en natuurlike gras totdat ‘n gemiddelde lewendige massas van ongeveer 35 kg bereik het (lam ouderdom/0 permanente tande). Die gekastreerde IVB bokke was gemiddeld 1 kg ligter as die ander diere.

Hierna is hul geslag en die karkasse is oornag in ‘n koelkas van ongeveer 4°C geplaas. Buiten die warm karkasmassas, is die verdere karkaskwaliteitsmetings die volgende dag geneem. Die koue karkasmassas was tussen 14 to 16 kg en daar was ‘n warm tot koue karkasmassa verskil van ongeveer 3.5%. Die uitslag % vir die gekastreerde diere (BB en IVB)(44.5%) wat ongeveer 2.5% hoër was as die van die intakte rammetjies (42.0%). Ons het die sogenaamde vyfde kwart nie bestudeer nie.

Oogspier omtrekke gemeet in mm² van die intakte ramme van beide die BB en IVB het nie verskil nie, maar die gekastreerde BB se omtrekke was effens groter end die van die gekastreerde IVB was effens kleiner – te wagte a.g.v. die kleiner karkasse.

Die karkasse is in die volgende kommersiele snitte verdeel en geweeg: nek, dikrib, lies, blad, bors, lende, kruis, boud en skenkel. Elkeen van hierdie snitte is weer gedisekteer om die % been, % sigbare vet en % vleis vir elke snit te bepaal. Verskille wat uitgestaan het tussen die 4 proefgroepe is die hoër nek % en dikrib % van die gekastreerde BB, die groter % lies by die BB oor die algemeen en die hoër % lende en boud van die gekastreerde IVB. Die % kruis van die gekastreerde diere was effens hoër in vergelyking met die intakte diere.

Uit bogenoemde massas is die % vleis, % been en % sigbare vet (insluitend onderhuidse vet) per karkas bereken. Verstaanbaar het die intakte ram karkasse ‘n 1 tot 2 % hoër been persentasie van ongeveer 23% gehad teenoor die van 22% van die gekastreerdes. Die gekastreerdes het weer ‘n 2 tot 4% hoër totale vet % gehad van 9 to 10% teenoor die van die intakte ram karkasse van 6% vir die IVB en 8% vir die BB. Teenoorgestelde is weer gevind dat intakte IVB ram karkasse ongeveer 1% meer vleis (71% van die karkasmassa) gehad het in vergelyking met die van die BB karkasse (69% van die karkasmassa) en die gekastreerde IVB ‘n karkasvleis % van 67% gehad het. Niere en niervet is ook geweeg. Niervet (kg) in al die gekastreerde karkasse (0.4 kg) was meer as die van die intakte ram karkasse van ongeveer (0.3 kg).

Dit lyk asof IVB nie so goed reageer op kastrasie nie omdat hulle so effens ligter was as die ander toetsgroepe en verdere studies hieromtrent is nodig. Hierdie kan ook dalk toegeskryf word aan kompetisie vir kos en kompeterende diere behoort alpart gehou te word. Tog lyk dit nie of dit die gekastreerde Boerbokke gepla het nie. Die uitslag persentasies het egter nie verskil tussen die gekastreerde rasse nie en was effens hoër as die van die intakte ramme, hoofsaaklik a.g.v. hoër % sigbare vet. Daar was nie noemenswaardige verskille in die % vleis tussen die rasse nie. Die groottes van die verskillende snitte

verskil a.g.v. bouvorm en dit is genotopies te wagte, maar oor die algemeen gee die Boerbok en groot raam Inheemse Veld Bokke dieselfde tiepe opbrengs onder dieselfde produksie omstandighede.

Hierdie studie is deel van 'n groter projek wat deur die Rooi Vleis Navorsings en Ontwikkeling SA (verteenwoordiger van die rooivleisbedryf) en Landbounavorsingsraad befonds word.

Please contact the Primary Researcher if you need a copy of the comprehensive report of this project – Lorinda Frylinck on lorinda@arc.agric.za

- Animal Products, Cattle and Small Stock, Quality and Value-adding
- ◆ 2018, ARC, ARC-API, CSS, Frylinck, Online
- < Genomic markers in beef tenderness
- > Shiga toxin-producing Escherichia coli in beef

DEADLINES for RESEARCHERS 2021

Proposals for 2021: TBC

Progress reports: 28 Jan 21

Final reports: 29 Jan 21 Final includes comprehensive report and popular article

COMMITTEE MEETINGS for 2021

RMRDSA CSS Planning - TBC

Project Committee - TBC

Pork Planning - TBC



Calendar

< Apr 2021 >						
Sun	Mon	Tue	Wed	Tur	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

PORK Priority Areas

Cattle & Small Stock Programmes

1 Sustainable natural resource utilisation

2 Improvement of Livestock production and forage

3 Management of agricultural risk to create a resilient Red Meat sector

4 Sustainable health and welfare for the Red Meat sector

5 Enhancement of production and processing of Animal Products

6 Consumer and market development of the Red Meat sector

7 Commercialisation of the emerging sector

