

The effect of slaughter age on the lamb characteristics of Merino, South African Mutton Merino and Dorper lambs

by

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DECLARATION

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Date

SUMMARY

The aim of this study was to investigate the effect of feedlot production on the growth and carcass characteristics, as well as the distribution of the main tissues (muscle, fat and bone) and meat quality of Merino, South African Mutton Merino (SAMM) and Dorper lambs.

The Merino and SAMM 2008 outperformed ($P<0.05$) the 2007 SAMM and both Dorper production groups in terms of average daily gain, while the Merino and both SAMM production groups achieved the best feed conversion ratio ($P<0.05$). The highest percentage A2 graded carcasses was achieved after 42 days under feedlot conditions by the Merino and both Dorper production groups, but it took only 21 days in the feedlot for the SAMM lambs to achieve the same result.

Slaughter weight, carcass weight and dressing percentage all increased significantly with an increase in the number of days under feedlot conditions for all three breeds, while a decrease in the percentage head, trotters and red offal was also documented. The fatter retail cuts (thick rib, flank, prime rib and loin) increased ($P<0.05$) in percentage with an increase in the number of days under feedlot conditions. A significant decrease in the percentage leaner retail cuts (raised shoulder and hind-quarters) was found when the amount of days under feedlot conditions increased. The highest profit is obtained by the prime rib, loin and hind-quarters in a lamb carcass. For the Merino and Dorper lambs these three cuts, or a combination of the three showed the highest combined percentages after 42 and 63 days under feedlot conditions, respectively. The late maturing SAMM lambs achieved the highest percentages for these three cuts after 63 and 84 days under feedlot conditions in 2007 and 2008 respectively.

Visceral and renal fat deposition increased throughout the production period for all breeds. The Dorper lambs attained the highest subcutaneous fat depth, and also produced the heaviest, but fattest carcasses. For A2-graded carcasses, Dorper lambs had the highest dressing percentage and lowest subcutaneous fat depth, followed by the SAMM and then Merino breed. A decrease in the percentage muscle and bone was found with an increase in the number of days under feedlot conditions, whilst an increase in the percentage fat was found under the same conditions.

Meat quality was mostly affected by the 48h *post mortem* pH. This pH value is affected by the cooling rate of the carcasses, which in turn is affected by the level of carcass fatness. Carcass fatness increased with an increase in the number of days under feedlot conditions, resulting in a low 48h *post mortem* pH. A low 48h *post mortem* pH is accompanied by higher percentages of cooking and drip loss, as well as a high a^* -colour reading for all three breeds.

OPSOMMING

Die doel van hierdie studie was om die effek van voerkraalproduksie op die groeivermoë, karkaseienskappe, verspreiding van spier, been en vet, en vleiskwaliteit van Merino, Suid-Afrikaanse Vleismerino (SAVM) en Dorperlammers te bepaal.

Die Merino en SAVM 2008 produksiegroepe het hoër ($P < 0.05$) gemiddelde daaglikse toenames getoon as die SAVM 2007 en beide Dorper groepe, terwyl die Merino en beide SAVM produksiegroepe die beste voeromset verhoudings bereik het ($P < 0.05$). Die hoogste persentasie A2 gegradeerde karkasse is na 42 dae in die voerkraal deur die Merino en beide Dorper produksiegroepe geproduseer, terwyl dit slegs 21 dae onder dieselfde toestande vir die SAVM groepe geneem het om dieselfde resultaat te lewer.

Daar is 'n betekenisvolle verhoging in slagmassa, karkasmassa en uitslagpersentasie vir al drie die rasse gevind met 'n toename in die aantal dae in die voerkraal, terwyl 'n afname in die persentasie kop, pote en haarslag gevind was. Die persentasie vetter groothandelsnitte (dikrib, dunrib, ribtjop en lendesnit) het toegeneem ($P < 0.05$) met 'n toename in die aantal dae in die voerkraal. 'n Betekenisvolle afname in die persentasie van die maerder groothandelsnitte (blad en boude) is gevind met 'n toename in die aantal produksie dae in die voerkraal. Die hoogste inkomste van 'n lamkarkas is afkomstige van die ribtjop, lende snit en boude. 'n Kombinasie van hierdie drie snitte was die hoogste vir die lammers van die Merino en beide Dorper groepe na 42 en 63 dae in die voerkraal onderskeidelik. Die laat volwasse SAVM lammers het die hoogste persentasie van hierdie drie snitte bereik na 63 en 84 dae in die voerkraal vir die SAVM 2007 en SAVM 2008 onderskeidelik.

Die neerlegging van pensvet en niervet het voortdurend toegeneem deur die produksieperiode vir al drie rasse. Die Dorperlammers het die hoogste onderhuidse vetneerlegging getoon, maar het ook die swaarste en vetste karkasse geproduseer. Dorperlammers het die hoogste uitslagpersentasie en laagste onderhuidse vetneerlegging vir A2 gegradeerde karkasse gehad, gevolg deur die SAVM en Merino. 'n Afname in die persentasie spier en been in karkasse is waargeneem namate die lammers langer in die voerkraal was, terwyl 'n toename in die persentasie vet onder dieselfde omstandighede waargeneem is.

Die 48h *post mortem* karkas pH affekteer die meeste vleiskwaliteit eienskappe. Hierdie pH waarde word weer deur die tempo van karkasafkoeling beïnvloed, wat op sy beurt deur die vetheidsgraad van die karkas bepaal word. Die vetheid van karkasse het toegeneem met 'n toename in die aantal dae in die voerkraal, wat 'n lae pH waarde 48h *post mortem* tot gevolg gehad het. 'n Lae 48h *post mortem* pH waarde het gelei tot hoër persentasies kook- en dripverliese en hoër a^* kleurlesings vir al drie rasse.

Parts of this thesis have been presented at:

1. **54th International Congress of Meat Science and Technology, Cape Town, August 2008, in the form of a presentation and a poster.**

Presentation

Van der Westhuizen, E.J., Brand, T.S., Hoffman, L.C., Aucamp, B.B., 2008. The effect of gender on the fat distribution in Merino lambs.

Poster

Van der Westhuizen, E.J., Brand, T.S., Hoffman, L.C., Aucamp, B.B., 2008. The effect of gender on the fat distribution in Merino lambs.

2. **43rd SASAS Congress, Alpine Heath, July 2009, in the form of a poster**

Poster

Van der Westhuizen, E.J., Brand, T.S., Hoffman, L.C., Aucamp, B.B., 2008. The effect of age on the fat distribution in Merino lambs.