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CARCASS QUALITY AND COMMERCIAL ACCEPTANCE OF ANGORA GOAT KIDS FED SUPPLEMENTARY ENERGY AND SLAUGHTERED AT FIVE MONTHS OF AGE

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SUMMARY

The effects of feeding supplementary energy to grazing pregnant and lactating Angora does and of rearing status on carcass quality and commercial acceptance of kids slaughtered at 20 weeks of age (mean ± sd, liveweight 15.0 ± 2.9 kg, range 8.3-23.1; carcass weight 6.1 ± 1.5 kg, range 2.8-11.0) are reported. The design was 5 levels of whole barley grain supplementation (GL) x 2 levels of forage availability (FL) x 2 replicates fed from 8 weeks before kidding to 8 weeks after kidding. Levels of GL were 0, 125, 250, 375 and 500 g/day. Levels of FL were: P - pasture with minimal supplements of lucerne hay, P+H - pasture with moderate levels of lucerne hay supplements. Replicates consisted of a group of 1 dry, 3 single parity and 1 twin parity doe allotted randomly following stratification based on parity, liveweight, faecal strongyle egg count, and mating time. Stocking rate was 5 does/ha. Green herbage availability increased from 200 kg DM/ha in June to 2200 kg DM/ha in November. An interaction between GL and FL affected carcass weight of single reared kids when no grain was fed with P significantly less than P+H (4.8 vs 6.5 kg, sed 0.58, P<0.05). GL affected mean carcass weight (P<0.05) particularly of single reared kids (P<0.05) with carcass weights significantly higher at GL 375. GL affected the proportion of carcasses acceptable to the commercial kid meat market in Melbourne with acceptance greatest at GL 375. More than half the twin kids in the experiment (21/40) had carcasses which were unsuitable for the kid meat market at 20 weeks of age.

Keywords: supplements, nutrition, management, growth, meat

INTRODUCTION

Angora goats represent about 50% of Australia's farmed goat flock. They are kept for mohair and meat production and weed control. Sales of goats for meat production forms an integral component of income for mohair producing flocks. In recent years quality kids have sold for prices of up to $25/head. Recent studies have confirmed that adult Angora wether goats have only moderate levels of carcass fat (16-25%), that dressing percentage increases with liveweight and that body condition scoring is a practical method for assessing carcass fatness and when used with carcass weight accounted for 92% of the variation in carcass fat (McGregor 1992). However there is no information on the effect of normal commercial farming practices, or rearing status on the quality and yield of Angora kid carcasses. This study reports the effects of rearing status and the feeding of supplementary energy to grazing pregnant and lactating Angora does on the carcass quality and commercial acceptance of their kids.

MATERIALS AND METHODS

Design and diets

A herd of 200 Australian Angora does (2 to 6 years of age) grazing annual temperate pastures at Werribee (37°54'S., 144°41'E., elevation 46 m), Vic., were mated in February 1993. Pregnancy status was determined by ultrasound at 65 days after median mating date (May 14). Experimental design was 5 levels of whole barley grain supplementation (GL) x 2 levels of forage availability (FL) x 2 replicates. Levels of GL were: **Control (C)** - no barley, **125** - 125 g/day barley, **250** - 250 g/day barley, **375** - 375 g/day barley, **500** - 500 g/day barley. Levels of FL were: **P** - pasture with minimal supplements of lucerne hay. In June and July the pastoral conditions were poor and limited hay feeding of pregnant does became necessary, **P+H** - pasture with moderate levels of lucerne hay supplements. Replicates consisted of a group of 1 dry, 3 single parity and 1 twin parity does allotted randomly following stratification based on parity, liveweight, faecal strongyle egg count, and mating time. Stocking rate was 5 does/ha.

Does were put onto plots on June 7. Grain feeding began on June 9 at the rate of 50g/head/day. The amount of grain fed to treatment 500 was increased by 50 g/head every second day until the desired level of 500 g/head/day was reached on June 27. The amount fed to the other treatments was increased in proportion to maintain the relative differences between treatments. Crushed limestone, $Ca(CO_3)_2$ was added at a rate of 1.3% and thoroughly mixed with the grain. From June 30 grain feeding levels were adjusted to enable the weekly ration to be fed over 6 days. Both grain and hay were fed out on the ground according to normal farming practice. Kids were dosed with ivomectin at 10 weeks of age and vaccinated at 4 and 8 weeks of age. Pasture availability was estimated using McIntyre Rank Sets (McIntyre 1952).

Carcass weight and quality

On December 21, at 20 weeks of age and 2 weeks following shearing, 70 kids were slaughtered at a commercial abattoir 90 km from the Institute. Kids were weighed and condition scored (CS), using the techniques of McGregor (1983, 1990), directly off pasture 24 hours prior to slaughter, and placed in lairage with water until transported to the abattoir 5 hours prior to slaughter. Thirty kids considered to be too light or low in body condition were not slaughtered. Prior to slaughter 15 kids of each sex were selected to cover the entire range of liveweights (including light weights) to enable accurate predictions of the carcass weight of kids not slaughtered. Following slaughter according to Australian industry standards (Anon., 1987a) carcasses were weighed (0.1 kg), and total tissue depth at the GR site on the 12th rib was measured to the nearest mm (Anon., 1987b). Commercial acceptance was determined by an experienced wholesale butcher (M. Delahunty, per. comm.). Skin and offal including rumen and intestines were collected at slaughter from the 30 identified kids, stored at 4°C and weighed and measured within 48 hours of slaughter.

Statistical and chemical analysis

Analysis of variance was used to estimate treatment effects. Means were taken of data for twin kids. Analysis of CS used the methods of McGregor (1990). Standard errors of difference between means (sed) and the variance ratio to calculate the probability of significant differences between means (P) were obtained using Genstat (1983) release 5.3.1.. Means which were not significantly different are shown as NS. Data were pooled for multiple linear regression analyses to estimate the predictive value of variables other than the main treatment effects. Samples of feed were analysed for crude protein (CP), acid detergent fibre (ADF), estimated dry matter digestibility (DMD) and estimated metabolizable energy (ME) by near infra-red spectrophotometry (NIR) at Agriculture Victoria, Hamilton.

RESULTS

Nutrient composition and intake of ration

Nutrient composition of the feeds (g DM/kg) were 216 CP for lucerne and 84 CP and 66 ADF for barley grain. DMD and ME were 66.1% and 9.2 MJ/kg DM for lucerne and 81.8% and 11.9 MJ/kg DM for barley grain. Rations were consumed quickly. No accumulation of uneaten hay occurred. Mean amounts of hay fed g/head/day were: June 9 to August 2, P 370; P+H 820, and August 3 to September 27, P zero; P+H 800.

Effect of treatments on pasture availability

The seasonal conditions were poor with a very late germination in mid June. Pastoral conditions remained poor until late September and the spring finished abruptly in late November. Total pasture availability in mid June was ≈1500 kg DM/ha. Availability of green herbage increased from ≈200 kg DM/ha in June to ≈2200 kg DM/ha in November. No effects of FL on pasture availability were detected in any month. Significant effects of GL were detected on availability of green grass in July and November ($P<0.05$), and on total pasture availability in September ($P<0.1$) and November ($P<0.05$) with availability highest at GL 375 and 500.

Effect of liveweight and treatments on kid carcass weight and quality

Kid liveweight and carcass weight The mean and range of carcass parameters are given in Table 1. Significant linear regressions between liveweight and carcass characteristics for male and female kids are given in Table 2. The regression coefficients for carcass weight of male and female kids were different (t_{69} = 3.40, $P<0.01$), and indicate that for each 1 kg increase in liveweight of male kids carcass weight increased 488 g and for female kids for each 1 kg increase in liveweight carcass weight increased 549 g. GR depth increased with increasing liveweight (Table 2) and the increase was at a greater rate in female kids (t_{33} = 1.95, $P<0.1$).

Effects of treatments on kid carcass weight An interaction between GL and FL affected carcass weight of single reared kids with C fed kids having heavier carcasses in treatment P+H than in P (6.5 vs 4.8 kg, sed 0.58, $P<0.05$). GL affected mean carcass weight (sed 0.44, $P<0.05$, Figure 1) particularly of single reared kids (sed 0.41, $P<0.05$) with carcass weights significantly higher at GL 375. These effects correspond with liveweight responses.

Table 1. The mean, standard deviation (sd) and range in carcass and tissue parameters of Angora kids slaughtered at 20 weeks of age after grazing on annual pastures

Parameter	Mean	(sd)	Range	n
Liveweight (kg)	15.0	2.98	3-23.1	73
Carcass weight (kg)	6.1	1.5	2.8-11.0	73
Body condition score	5.6	1.8	2-9	73
GR measure (mm)	4.2	1.2	2-6	31
Carcass length (cm)	77.3	6.1	63-89.5	31
Caul fat (g)	180	126	4-577	31
Rumen weight (g)	415	77	218-595	31
Rumen contents (g)	1390	411	750-2127	31
Skin weight (g)	1377	364	404-2262	31

Table 2. Regression and correlation coefficients (R) for the relationships between kid liveweight and carcass and tissue parameters

Dependant variable	Constant (± se)	Regression coefficient (± se)	R	RSD	n
All kids					
Carcass weight (kg)	-1.25 (0.28)	0.488 (0.018)	0.95	0.45	73
GR (mm)	1.71 (0.89)	0.177 (0.058)	0.44	1.29	35
Male kids					
Carcass weight (kg)	-1.36 (0.34)	0.488 (0.021)	0.97	0.42	39
GR (mm)	0.55 (0.95)	0.210 (0.057)	0.63	1.07	20
Female kids					
Carcass weight (kg)	-1.98 (0.53)	0.549 (0.038)	0.93	0.45	34
GR (mm)	0.11 (1.37)	0.355 (0.099)	0.68	0.98	15
Skin weight (g)	+211 (153)	80.2 (10.2)	0.82	209	31
Caul fat weight (g)	-244 (48)	29.1 (3.2)	0.86	65	31

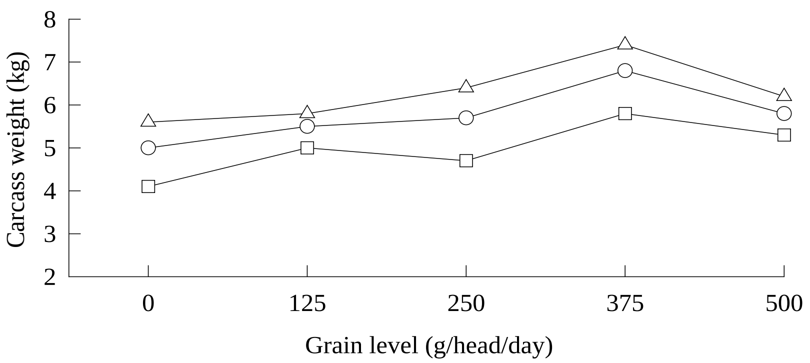

Figure 1. The effect of supplementary feeding with barley grain from 8 weeks before kidding to 8 weeks after kidding and rearing status on carcass weight of Angora kids slaughtered at 20 weeks of age. Rearing status : Single △ , Twin □ , Mean ○

The effect of treatment and parity on commercial acceptance of kid carcasses

GL affected the proportion of carcasses acceptable to the commercial kid meat market in Melbourne. The numbers of kids assessed as unsuitable with either low carcass weight or low body condition score are given in Table 3. Twin kids, which represented 40% of the kids in the experiment, were the major contributor to the number of unsuitable kids (≈60%) and represented most of the unsuitable kids at GL 375 and 500 (5 of the 6). More than half the twin kids in the experiment (21/40) had carcasses which were unsuitable for the kid meat market at 20 weeks of age.

Table 3. The effect of whole barley grain supplementation (GL) and of increasing forage availability (FL) by supplementing pasture with lucerne hay on the commercial acceptability of carcasses of Angora kids slaughtered at 20 weeks of age. The number of carcasses assessed by a wholesale butcher as being too light or too low in body condition score are shown. GL and FL commenced 8 weeks before and continued until 8 weeks after kidding

Forage	Level of barley grain supplementation (GL)					
Availability (FL)	C	125	250	375	500	Total
Pasture only	4	6	2	1	2	15
Pasture and Hay	5	4	5	0	3	17
Total number	9	10	7	1	5	32
% unacceptable	45	50	35	5	25	32

DISCUSSION

This study provides a number of significant commercial observations which should improve the management and commercial returns of goat breeders and meat wholesalers. These observations include the effect of cereal grain and hay and the effect of rearing status (twins versus single kids) on carcass weight and commercial carcass acceptance and the effect of sex on carcass yield.

Treatments which increased liveweight increased carcass weight. The feeding of hay only increased kid carcass weight when no grain was fed but provision of barley grain at 375 g/day maximised carcass weight. Commercial evaluation of carcasses indicated that only half the carcasses from GL treatments C and 125 were acceptable while 95% of the carcasses from GL 375 were acceptable. The heavier carcasses in this study had GR measurements of 6 mm and were considered ideal for commercial meat markets.

Kids reared as twins provided 60% of the unacceptable carcasses, representing 50% of all twins in the experiment. This indicates that if kids are being sold for meat production then the feeding or selling strategy of kids from twin rearing does needs to be significantly different to the strategies used for single rearing does.

These results also show that for each 1 kg of liveweight gain does produced 12% more carcass than buck kids. Corresponding commercial allowances must be made for doe kids in meat production activities.

This experiment has provided information which will alter the current recommended practices for the management of reproducing Angora does, recommendations based on limited experimental data (McGregor 1988). Clearly the practical application of the results will depend on seasonal and environmental conditions and on obtaining higher prices for premium carcasses but the data will allow farmers and advisers to make more informed decisions on the likely liveweight and carcass weight responses when considering whether to feed cereal grain and hay supplements to flocks of grazing reproducing does. In conclusion this experiment, conducted after a late pasture germination and with low pasture availabilities, showed that the feeding of hay only increased kid carcass weight when no grain was fed but provision of barley grain at 375 g/day from 8 weeks before to 8 weeks after kidding maximised carcass weight and provided almost complete commercial acceptance of kid carcasses whereas providing no or 125 g/day of barley grain supplements produced light carcasses of limited commercial acceptance.

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