2-P5

GROWTH AND CARCASS CHARACTERISTICS OF GOAT WETHERS FROM SIX GENOTYPES

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Background and Objectives:

Annual goat meat production in the world was around 3.5 million metric tonnes in 1996 (FAO, 1996). Goats contribute to the meat supply mainly in developing countries, where it is consumed without going through organised marketing channels (Gall, 1982). There is a large number of goat breeds in the world and mature size of goats can vary ten-fold between breeds, with consequent variation in growth rates (Warmington and Kirton, 1990). The carcasses of most goat breeds tend to be leaner and have thinner subcutaneous fat cover compared to sheep carcasses (Naude and Hofmeyr, 1981). Consumers prefer and value low fat, high quality products and therefore, goat meat offers an attractive alternative to other types of red meat because of its low intramuscular and subcutaneous fat (Potchoiba *et al.*, 1990). There is little published information available regarding comparisons of different goat breeds for meat production. Therefore, the present study was conducted to investigate the performance of goat wethers from six genotypes for growth and carcass characteristics.

Methods:

Six goat genotypes, Boer x Angora (BA), Boer x Feral (BF), Boer x Saanen (BS), Feral x Feral (FF), Saanen x Angora (SA) and Saanen x Feral (SF) were used in the study. Thirty kids (five from each genotype) were randomly selected from 150 F_1 generation male kids born during Oct.-Nov., 1997. These kids were castrated, weaned at 10-15 kg liveweight and raised on pasture with *ad libitum* access to concentrate pellets (CP 18% and ME 12.3 MJ/kg). Kids were weighed every fortnight, to calculate the liveweight gain (g/day) and slaughtered when they reached a liveweight in the range of 30-35 kg. The dressed carcass did not retain kidneys, kidney and pelvic fat and scrotal fat. Hot carcass weight and weights of head, skin, some visceral organs (heart, liver, lungs, gastro-intestinal tract and kidneys) and fat depots (scrotal fat, kidney and pelvic fat and omental fat) were recorded. Empty body weight (EBW) was calculated by deducting the weight of stomach contents from the fasted liveweight at slaughter. Dressing percentage was calculated based on EBW. After chilling, the carcasses were split down the dorsal midline and left sides were used for all measurements. Carcass length was taken from the *symphysis pubis* to the anterior edge of the middle of the first rib. Fat depth measurements on the carcass were taken using a ruler, at the 12/13th rib and rump (lateral to 3rd sacral vertebra) sites. Eye muscle area was measured at the 12/13th rib position. The left side of the carcass was separated into dissectible muscle, bone and fat, with the subcutaneous and intermuscular fat depots being recorded separately; the weight of each component was expressed as a percentage of side weight. All data was analysed using the General Linear Model (GLM) procedures (SAS, 1989).

TABLE 1

Growth parameters (Least Squares Means and Standard Errors) from goat wethers of different genotypes

Parameters	Genotype						
	BA	**BF**	**BS**	**FF**	**SA**	**SF**	
	LSM						SE
Birth weight (kg)	3.7	3.5	4.1a	3.2b	3.2b	3.4b	0.24
Age at slaughter (days)	263a	255ac	219b	260a	231	221bc	12.88
Liveweight (kg)	30.4b	30.6bc	33.9ac	30.9bc	34.3a	33.8	1.22
Liveweight gain (g/day)	103b	108b	137a	108b	139a	138a	9.92
Fasted liveweight (kg)	28.0	28.7	30.4	28.5	30.6	30.6	1.20
Empty body weight (kg)	25.8	26.6	28.2	26.7	28.5	28.5	1.17
Visceral organs (as %age of empty body weight)							
Head	6.8a	6.6a	6.8a	6.3ac	6.0bc	5.7b	0.18
Skin	8.2a	7.0b	7.1b	7.1b	6.9b	6.2c	0.20
Heart	0.5	0.5	0.5	0.5	0.6	0.6	0.02
Liver	2.1	1.9b	2.1	1.9b	2.3a	2.0	0.09
Lungs	1.1	1.0	1.1	0.9b	1.1a	1.1	0.08
Gastro-intestinal tract	15.5	14.9	15.3	14.1	16.0	14.6	0.74
Kidneys	0.4a	0.4	0.4	0.4b	0.4	0.4	0.01
Internal fat depots (as %age of empty body weight)							
Scrotal fat	0.4b	0.4bc	0.4bc	0.6	0.7a	0.6ac	0.08
Kidney and pelvic fat	1.2b	1.1b	1.0b	2.1a	2.2a	2.2a	0.25
Omental fat	2.2bc	1.8b	1.8b	3.1ac	3.6a	3.2ac	0.45
Total internal fat	3.7b	3.3b	3.2b	5.8a	6.4a	6.0a	0.74

Least squares means with different letters are significantly ($P \leq 0.05$) different within rows

Results and Discussions:

The birth weight of BS kids was significantly higher compared to FF, SA and SF kids (Table 1). The birth weight of a kid depends primarily on the conformation and size of the adults of the breed to which it belongs (Morand-Fehr, 1981). Mature weight of males from Boer and Saanen breeds is in the range of 80-120 kg compared to 27-36 kg for feral goats (Warmington and Kirton, 1990). Results in the present study indicated that BS and SF kids had better liveweight gains than kids from other genotypes. Gibb *et al.* (1993) reported a significant effect of breed type on daily liveweight gain in goats.

In the present study, BA kids had a higher percentage of skin compared to other genotypes. A higher percentage of pelts in Angora goats compared to other breeds had been reported by Riley *et al.* (1989). There were some differences between genotypes in weights of liver, lungs and kidneys as a percentage of EBW. Gibb *et al.* (1993) found a significant effect of breed type in goats, on the weights of visceral organs, as a proportion of liveweight.

TABLE 2
Carcass characteristics (Least Squares Means and Standard Errors) from goat wethers of different genotypes

Parameters	Genotype						
	BA	**BF**	**BS**	**FF**	**SA**	**SF**	
				LSM			SE
Hot carcass weight (kg)	13.7b	14.3	15.2	14.4	15.2	15.8a	0.56
Dressing percentage	53.2b	53.7	53.9	53.8	53.7	55.2a	0.62
Carcass length (cm)	54.4b	56.8a	57.0a	54.9b	57.7a	57.2a	0.67
Eye muscle area (cm^2)	11.5	12.0	12.0	12.0	11.2	12.8	0.54
Fat thickness							
$12/13^{th}$ rib (mm)	1.8b	2.2	2.2	2.4a	2.2	2.0	0.20
Rump (mm)	2.6	2.0b	2.0b	3.0a	2.4	2.2	0.32
Dissected carcass composition (as %age of side weight)							
Muscle	65.0a	65.9a	65.6a	63.6a	60.1b	63.9a	1.01
Subcutaneous fat	6.7a	4.9b	4.9b	6.4	6.9a	5.4	0.59
Intermuscular fat	6.8bc	6.8bc	6.2b	8.7	10.4a	9.2ac	0.98
Total carcass fat	13.5	11.7bc	11.1b	15.0ac	17.2a	14.6	1.32
Bone	20.0	20.1	21.7	20.0	21.2	19.8	0.77

Least squares means with different letters are significantly ($P \leq 0.05$) different within rows

Saanen cross kids (SA and SF) and FF kids deposited more internal fat than Boer cross kids (BA, BF and BS). Dairy breeds of goats tend to store more fat as visceral, rather than as carcass adipose tissue (Gibb *et al.*, 1993). Differences in deposition of internal fat between different breeds of goats had also been reported by Snell (1996).

The dressing percentage (based on EBW) of kids ranged from 53-55% (Table 2), which is in agreement with the results of Potchoiba *et al.* (1990). Higher carcass length for Boer cross kids (BS and BF) and Saanen cross kids (SA and SF) compared to other genotypes used in the present study can be related to the larger size of Boer and Saanen breeds compared to Angora and Feral goats. The eye muscle area ranged from 11-13 cm^2 and it did not differ between various genotypes. In the present study, subcutaneous fat depth taken on carcasses at the $12/13^{th}$ rib and rump sites was in the range of 2-3 mm. Similar results on subcutaneous fat cover have been obtained by Naude and Hofmeyr (1981) in various breeds of goats.

The carcass composition indicated that BS and BF kids were leaner compared to other genotypes particularly SA kids. The percent carcass composition is in agreement with the results of (Gibb *et al.*, 1993) with respect to the significant differences in muscle and fat content and no differences in bone content between genotypes. Based on growth rate and carcass characteristics BS and SF had an advantage over other genotypes used in this study.

Conclusion:

The growth rate of goats was influenced by genotype, with kids from larger breeds growing faster. Kids from dairy breeds deposited more fat as internal fat compared to other breed types. The genotype of the goat influenced muscle and fat deposition in the carcass, with no differences in bone content.

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