

Meat, Carcass and Offal Yields of Goats

Introduction

Over the years I have often been asked about the amount of meat and the amount of fat in goat carcasses. A common misconception about goats was that they were lean, in fact leaner than sheep. This myth was based, I believe, on observations made on dairy type goats. For many years the most widely read book on goats was the bible of dairy goat keepers, David Mackenzie's "Goat Husbandry" first published in 1957. In the chapter on Goat Meat, Mackenzie discusses meat from castrated male (wether) goats of 9 to 18 months of age and states that the problem is "lack of fat". He quotes a Spanish reference "The goat is a bad butchers beast". The problem of lack of fat can be overcome by "larding" (running strips of pork fat through the flesh) or by "marinating" in olive oil for 3 or 4 days. It seems that the butchers' problem was actually a cooks' problem, and now cooks are looking for lean meat. In recent years Australian goat meat buyers have discriminated against goats if their carcasses were too fat. So how much meat and fat are in Australian goat carcasses?

This article provides information on the meat yield, carcass composition and yield of other components (offal) from Australian goats. Offal yield can be important as sometimes the offal value can exceed the value of the carcass. The skin can also be valuable if suitable skin markets exist.

What are the body components of a live goat?

To determine the components of a live Angora goat, 30 Angora wethers were grazed on annual pastures from 6 months of age, for periods up to 4 years of age. At intervals, goats were randomly selected and slaughtered. The mean live weight of the slaughtered goats was 30 kg (range 11.2 to 48.1 kg) and mean age 2½ years. Prior to slaughter, goats were removed from feed and water for 24 hours. Following slaughter the components of the bodies were carefully weighed, cleaned where appropriate, and carcasses were minced and sampled for chemical analyses. Blood was not measured but gut contents were collected.

Statistical analyses allowed me to relate the weight of the components to the live weight of the goats. These relationships or equations are used to estimate or predict the components of animals of known live weight. There is always variation due to differences in gut fill and fleece weight, and individual variation between animals. Table 1 shows a list of the predicted components of an Angora wether goat with a fasted live weight of 30 kg.

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Table 1. The body components of an Angora wether goat with a fasted live weight of 30 kg

Component	Weight kg	% of live weight
Carcass	13.4	44.6
(fat in carcass)	2.83	(9.4)
Skin	2.55	8.5
Head	2.10	7.0
Feet	0.73	2.4
Liver	0.44	1.4
Lungs	0.38	1.2
Heart	0.15	0.5
Rumen/reticulum	0.68	2.2
Intestines	1.23	4.1
Gut contents	5.92	19.7
Omental fat	0.64	2.1
Mesenteric fat	0.59	2.0
Peri-renal fat	0.28	0.9
Kidneys	0.09	0.3
Pancreas	0.05	0.2
Spleen	0.06	0.2
Gall bladder	0.02	0.1
Diaphragm	0.12	0.4
Pizzle and bladder	0.11	0.4
Other	0.14	0.5
Total measured	29.4	98.0

The major component in the body of goats is water. Water usually makes up 60 to 70% of the body with fat and minerals making up most of the remainder.

Gut contents, from the rumen, other stomachs and the intestines comprise nearly 20% or one fifth of the weight of a fasted 30 kg goat. If goats are fasted for 24 hours they commonly lose 1 to 2 kg of weight. If this weight is added to measured gut contents it indicates that **gut contents represent 7 to 8 kg of the weight or almost one quarter of the live weight of 31 to 32 kg grazing goats.** It is not surprising that if goats are deprived from feed and water for periods during yarding, shedding and transport that their weight, as measured on scales, declines. Short term fasting of 24 to 48 hours (in cool weather) does not result in significant changes in carcass weight.

The portion of the 30 kg goat normally regarded as edible in Australia, the carcass, liver, heart, intestines, spleen, brains, omental and peri-renal fat amounted to about 16.4 kg or 54.7%. The head and skin together represent 15% of the animal. (In this study some mohair was present on the skins, amounting to about 350 g.)

Fat deposits are easily measured around the kidneys (peri-renal fat), the rumen (omental fat) and the intestines (mesenteric fat) and when added to all the fat from the carcass deposits totalled 4.34 kg or 14.5%. This is not the total fat in the goat as I did not chemically extract fat from the other organs and tissues. Probably the total amount of fat in the 30 kg goat would be approximately 20% of the live animal.

The carcass of the 30 kg Angora wether contained 21.1% fat (2.83 kg fat /13.4 kg carcass). This compares with earlier studies with grazing Saanen wether goats whose 14 kg carcasses contained 17.1% fat. Extensive studies with Australian meat type lambs showed that 15 kg lamb carcasses contain 22.7% fat. At these carcass weights grazing Angora goats have similar levels of carcass fat to lambs but Saanen goats had lower fat levels and consequently 7% more lean meat than lambs.

How much saleable meat is on that goat?

Producers of goats for meat are really in the business of growing saleable carcasses. As goats grow they deposit more fat in their carcass, reducing the percentage lean and increasing the percentage fat. The main influences on carcass weight and composition are live weight, breed, sex and nutrition.

Live weight

Studies with goats have indicated that as goats grow, **carcass weight increases by 0.43 to 0.54 kg for every 1 kg increase in live weight.** As live weight increases goats also tend to deposit more fat in their carcass. Figure 1 shows the relationship between the live weight and carcass weight for Angora wether goats grazed on pasture. Figure 1 also shows the carcass fat content of these Angora goats.

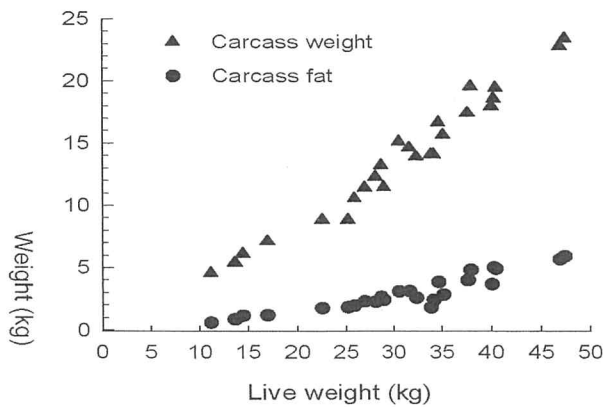


Figure 1. The relationship between the live weight of Angora wether goats grazed on pasture and their carcass weight and the weight of fat in their carcass

During growth from birth to maturity, fat deposits develop twice as fast as the empty body (body weight less the gut fill), while bone develops slower than the empty body. Muscles and the carcass develop at a slightly faster rate than the empty body. For example, data from a group of 16 week old cashmere kids showed an increase of 0.450 kg of carcass for every 1 kg increase in live weight. At 30 weeks of age, when the kids had grown a further 7 kg to approximately 21 kg, the data indicate that for each 1 kg increase in live weight carcass weight increased 0.515 kg.

Generally as goats grow, the proportion of the body that is the carcass, increases. This proportion is often called the dressing percentage. Dressing percentage can vary a lot depending on the management of the animal, whether it has been fasted, shorn and the diet which affects gut fill. For example, with Angora goats at 10 kg live weight the carcass represents about 35% of live weight but at 50 kg live weight the carcass may represent 48% of live weight.

Breed

There is increasing evidence that **at any given live weight** animals of larger mature size are leaner than animals of smaller mature size. Breeds of goats with larger mature size also tend to grow faster than breeds with a smaller mature size provided adequate nutrition is available and internal parasites are at low levels. The estimated mature size of some goat breeds are given in Table 2.

Table 2. The estimated mature size of some goat breeds

Breed	Mature weight kg
Boer	100-110
Saanen	90-100
Anglo-Nubian	80-90
Angora	60-80
Feral	45-80
Barbari	35-45
Dwarf African	20-25

Sex

Generally at any particular live weight entire males are leaner than castrates which are leaner than females. These generalisations can be distorted by management, lactation, seasonal conditions etc. Sexual maturity also influences development of the body. For example at the same live weight mature New Zealand feral does compared to mature bucks had heavier legs and loins but bucks had heavier shoulders and necks compared to the does (Table 3).

Table 3. The effect of sex on the proportion of a carcass in different carcass components of feral goats

Carcass Component	% of carcass in	
	Does	Bucks
Leg	31.3	29.8
Loin	11.5	10.2
Ribs	9.0	8.7
Shoulder	20.6	20.8
Neck	7.3	9.7

Nutrition

Nutrition can influence carcass fatness with grain feeding often resulting in fatter carcasses, than carcasses from animals of similar live weight that have grazed. Droughts and periods of live weight loss result in carcasses leaner than normally grown carcasses of similar weight. For example carcasses from drought affected Angora goats weighed 6.6 kg with 8.9% fat compared to normally grown carcasses with approximately 14.2% fat. During lactation, does usually use their fat reserves resulting in leaner carcasses but well fed does can actually lay down fat reserves during the latter part of lactation.

Angora type goats can become very fat if fed on cereal grain based diets. In another study Angora x feral goats were slaughtered after grain feeding for 18 weeks. Fasted live weights were 26.9 kg and carcass weights 13.3 kg. The carcasses of the wether goats had a fat content of 29.7% and doe carcasses contained 37.6% fat. The total of carcass, omental, peri-renal, and mesenteric fat was 6.33 and 8.05 kg for wethers and does, representing 23.4% and 30.1% of the fasted live weight. Total chemical fat measured would probably have been nearly 5% higher.

Carcass Meat Yield

The direct method of measuring the actual meat yield of a carcass is to take the carcasses to a commercial boning room where the butchers remove the meat from the bones. Using cashmere wether goats aged between 2.5 and 4.5 years with live weights ranging from 27 to 79 kg the following meat yields were measured:

- The carcass weights ranged from 12 to 33 kg
- Averaged over the entire kill, **for every 1 kg increase in live weight, boneless meat increased 0.307 kg** (Figure 2)
- Goats weighing more than 44 kg live weight, with body condition scores of more than 2, produced carcasses weighing more than 20 kg with a boneless meat yield of 64.2%
- Boneless meat yield declined to 61.1% at 13.8 kg carcass weight (Figure 3)
- live weight and body condition scoring, when used together, were the best methods of estimating carcass weight and meat production from goats

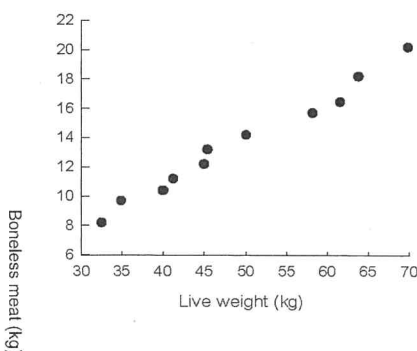


Figure 2 The relationship between the boneless meat content of cashmere wether goats as live weight increased

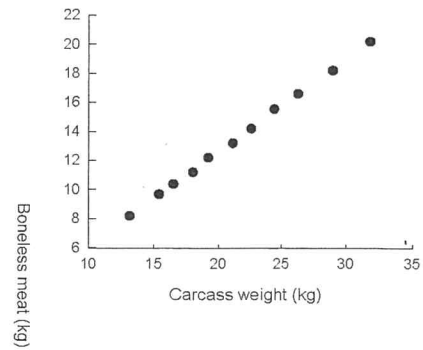


Figure 3 The relationship between the boneless meat content of wether goats as carcass weight increased

The conclusions are that:

- 1. live weight is the best single indicator for farmers to estimate carcass weight and boneless meat yield of goats kept for meat production**
- 2. farmers should use body condition scoring to ensure satisfactory nutritional management and commercial acceptance of goats for slaughter.**

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