



## Meat and Offal Yields of Goats

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Bruce McGregor, Attwood

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### Introduction

Meat consumers today prefer lean meat. Butchers need consistent products that always meet specification. Goats can produce lean meat but it is a common myth that goats are always lean. This myth is based on observations made on dairy type goats and on poorly fed goats. Australian goat meat buyers discriminate against goats if their carcasses are too fat. So how much meat and fat are in Australian goat carcasses? These issues are the subject of this Agriculture Note.

This Agriculture Note is designed to assist producers of goat meat to understand the biological influences on the production and quality of meat from goats. Information is provided on the meat yield, carcass composition and yield of other components (offal) from goats grown in southern Australia. The changes in meat and carcass yield as goats grow are discussed and illustrated. The influence of goat breed, sex and nutrition on carcass components and carcass fat are also discussed and illustrated. Suggestions are made regarding practices for goat meat production.

Further information on assessing live goats for meat marketing is provided in other Agriculture Notes.

### 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, and carcasses were minced and sampled for chemical analyses.

Table 1 shows a list of the predicted components of an Angora wether goat with a fasted live weight of 30 kg. It is important to note that there is always variation due to differences in gut fill and fleece weight, and individual variation between animals.

**Table 1. The predicted body components of a grazing 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	2.8	9.4)
Skin	2.5	8.5
Head and legs	2.8	9.4
Liver, lungs, heart	1.0	3.1
Stomachs	0.7	2.2
Intestines	1.2	4.1
Gut contents	5.9	19.7
Rumen fat	0.6	2.1
Intestinal fat	0.6	2.0
Kidney fat	0.3	0.9
Kidneys, other organs	0.45	1.5
Other	0.15	0.5
Remainder, blood	0.6	2.0

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) should 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, rumen and kidney fat amounted to about 16.4 kg or 54.7%. The head and skin together represent 15% of the animal but this would be greater if the fleece was long.

Fat deposits are easily measured around the kidneys (perirenal fat), the rumen (omental fat) and the intestines (mesenteric fat) and when added to all the fat from the carcass deposits totaled 4.34 kg or 14.5%. This was not the

total fat as fat in other tissues and organs had not been chemically extracted. The total amount of fat in the 30 kg goat would be approximately 20% of the live animal.

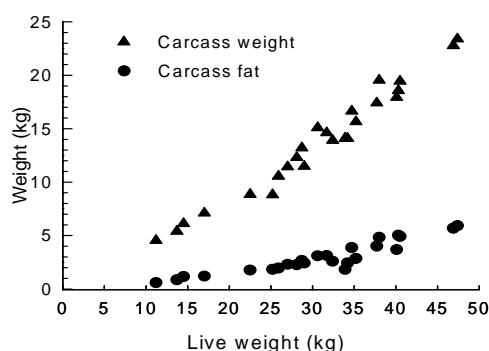
The carcass of the 30 kg Angora wether contained 21.1% fat. This compares with studies of grazing Saanen (dairy) wether goats whose 14 kg carcasses contained 17.1% fat. Extensive studies with Australian meat type lambs showed that 15 kg lamb carcasses contain 22.7% fat. At these carcass weights grazing 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 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 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, carcass weight and carcass fat for Angora wether goats grazed on pasture.



*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 at a slower rate than the empty body. Muscles and the total carcass develop at a slightly faster rate than the empty body. For example, data from a group of cashmere kids, 16 weeks old, showed an increase of 0.450 kg of carcass for every 1 kg increase in carcass 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 gain live weight, 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 and its sex, 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. Some influences on the dressing percentage of goats are summarised in Table 2.

**Table 2. Influences on the apparent dressing percentage of goats**

#### Influences that increase dressing percentage:

- Live weight – heavier animals usually have more muscle and fat
- Fasting – reduces gut fill before weighing
- Age – older animals tend to be heavier
- Grain feeding – reduces gut fill, increases fat deposits
- Milk fed kids – reduces rumen development and gut fill

#### Influences that reduce dressing percentage:

- Weaning – increases gut fill, reduces fat reserves
- Hay and straw feeding – increases gut fill
- Lactation – usually reduces fat reserves
- Mating – for bucks reduced appetite and weight loss
- Dry pastures – usually loss of live weight and fat reserves
- Heavy fleece – over estimates true live weight
- Large horns and testicles - in bucks these will reduce relative carcass weight

#### Breed

Breeds of goats with larger mature size 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 breeds of goat are given in Table 3. The variation within breed is large and some individuals are much heavier than the average mature size.

**Table 3. The estimated average mature size of goat breeds**

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

There is increasing evidence that **at any given live weight** animals of larger mature size are leaner than animals of smaller mature size. For example, at 40 kg live weight, following similar nutrition and health control, a Saanen wether will be leaner than a feral or cashmere wether. This is because the feral and cashmere goats are closer to their mature size than the Saanen.

#### 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. Generally female goats grow more slowly than male goats. Thus, for a given age the female goats will tend to be of lighter live weight and have smaller carcasses than male goats.

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 4).

**Table 4. 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. Droughts and periods of live weight loss result in carcasses that are 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.

Grain feeding often results in fatter carcasses than carcasses from animals of similar live weight that have been grazing. This “fattening” can be used to advantage to finish goats to meet certain market specifications if the nutrition from grazing has been insufficient. However too much grain feeding can lead to over fat goats. In one experiment, after grain feeding for 18 weeks, Angora x feral goats were slaughtered. Their fasted live weight was 26.9 kg and carcass weight 13.3 kg. The carcasses of the wether goats contained 29.7% fat and the 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.

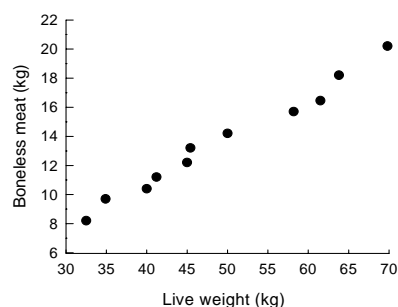
### Monitoring nutrition

The nutritional state of goats can be monitored by using both live weight measurements and body condition scoring. Body condition scoring is a technique of feeling the tissue deposits on the goat. A decline in body condition score is a good indication of a decline in nutrition. Body condition scoring of goats is discussed in a separate Agnote.

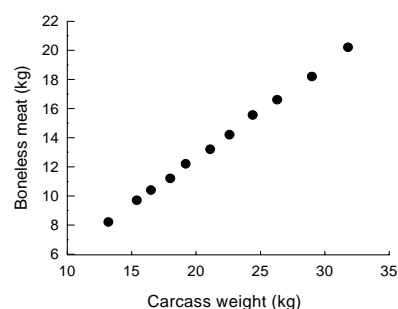
## Carcass Meat Yield

The direct method of measuring the actual meat yield of a carcass is to remove the meat from the bones. Cashmere wether goats aged between 2.5 and 4.5 years were grazed on typical annual pastures. At live weights ranging from 27 to 79 kg the following meat yields were measured:

- carcass weights ranged from 12 to 33 kg
- averaged over all goats, **for every 1 kg increase in live weight, boneless meat increased 0.307 kg** (Figure 2). Figure 3 shows the relationship between boneless meat yield and carcass weight.
- goats weighing more than 44 kg live weight, with body condition scores of more than 2, produced carcasses weighing more than 20 kg that had a boneless meat yield of 64.2%
- boneless meat yield declined to 61.1% at 13.8 kg carcass weight
- 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 live weight of cashmere wether goats and the amount of boneless meat*



*Figure 3 The relationship between the carcass weight of cashmere wether goats and the amount of boneless meat*

## Meeting market specifications

The best method of monitoring the carcass weight of goats is to measure the live weight of the goats. Live weight can be directly measured on live stock scales made for the purpose. Large electronic scales that have weigh bars can be used provided a suitable platform is made to restrain the animals.

It is possible to use other techniques that are less accurate. Girth tapes can be used to estimate live weight provided that they have been calibrated for goats.

Carcass finish or fatness can be monitored by using body condition scoring. Farmers should learn this technique and practice using the method whenever goats are handled. Goats that do not have the correct condition score should not be sold.

## Conclusions

For meat production from goats:

1. live weight is the best single indicator of the carcass weight and boneless meat yield
2. farmers aiming to market goats should weigh goats regularly to assist them in correct marketing
3. farmers should use body condition scoring to monitor nutritional management and commercial suitability of goats prior to slaughter.

## References and further reading

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