

Appendix 1

THE TREATMENT OF BEARINGS IN EWES

The successful treatment of bearings relies on early detection, gentle and clean replacement and effective retention.

- A bearing that has been out for more than 48 hours is very difficult to treat successfully. If the bearing is excessively swollen and/or lacerated or ruptured the ewe should be destroyed.
- The bearing must be well cleaned before it is reduced. Diluted disinfectant in a squeeze bottle should be carried in a kit for this purpose. Gross contamination and grass should be physically removed. During the process of cleaning, the bearing should be lifted up to allow urination to occur. It is very important that the bladder is not full when the bearing is being retained.
- Replacing the bearing is easier if the back end of the ewe is elevated. Applying a small amount of lubricant to the bearing can significantly ease retention and will reduce the amount of damage sustained. Lube in a squeeze bottle should also be in the kit. Pressure will usually need to be applied and gently maintained all around the bearing to enable it to be replaced.
- Once replaced most bearings will need to be retained. In mild cases, tying of wool around the back of the ewe or the tying of other external holding systems such as string tied around the back of the ewe will retain the bearing.
- Bearing retainers that apply direct holding pressure inside the vagina can be very effective. They do require wool of at least 3cm length to be attached to.
- The application of safety pins or sutures across the lips of the vulva are only partially effective and can in themselves cause much damage.
- A purse string suture with cotton tape applied deeply around the margins of the vulva is very effective in holding the back of the vagina closed and preventing the bearing coming out again. A veterinarian should be consulted to demonstrate the application of a purse string suture. Using a specialised needle makes this retaining technique easy to apply. If such a suture is applied within 2 weeks of lambing it will need to be cut prior to lambing. If the suture is applied longer than 2 weeks before lambing it will break at the time of lambing.
- Penicillin should be given to any ewe that has a damaged bearing or if sutures have been applied.
- After the ewe has been treated she is best taken from the mob and held on short feed, ideally on a flat paddock and observed.

Appendix 2.0

CAUSES OF LAMB DEATHS

Most lamb deaths occur before, during or at birth (parturient deaths, hypoxia and dystocia and lambs found on the birth site) or in the first three days after birth (starvation and infection and lambs found off the birth site). In good weather (ie thermoneutral temperatures) mismothered lambs can survive 2-3 days without a feed. In cold wet windy weather they can die within 12-24 hours. A cold wet night which kills a lot of lambs will often hasten the deaths of lambs that are going to die. After the initial peak of losses the number falls off dramatically especially if the storm is followed by fine warm weather.

- 1 **Congenital abnormalities** — Gross anatomical abnormalities (eg no lower jaw; no anus)
- 2 **Parturient deaths** — Dead well before birth or dies early in birth process
— autolysed (broken down) liver and kidneys ; slimy red
- 3 **Hypoxia** — lack of oxygen during the birth process
— usually associated with dystocia
— petechiation (blood spots in tissue) of thymus, heart or lungs
— no aeration of lungs & mucus in trachea (wind-pipe)
- 4 **Dystocia** — difficult birth resulting in birth injury
— caused by lamb being too large for pelvic opening or abnormal presentation of lamb
— oedema (clear jelly) on head or breach or legs
— ruptured liver ; bruising;
— fluid and fibrin (fine clear strands) in thorax (chest)
— blood in brain & spinal cord
- 5 **Exposure** — slight oedema on legs above hooves, tail, ears & nose
— caused by damage to tissue when frozen
— usually small lambs ; some fat left, food in stomach/ intestine
— tends to be over diagnosed
- 6 **Starvation** — failure to feed or continue to feed
— fat 'burnt up' (catabolised) around kidneys & heart
— usually without milk residues in stomach or intestine

- 7 **Infection**
 - gross ulceration of liver & / or lungs ;
or large amounts of fluid & fibrin in Peritoneum (abdomen)
 - often associated with catabolism of fat but with milk in stomach/intestines
 - *Fusobacterium necrophorum* is possible cause of ulceration
 - enters via navel

- 8 **Misadventure**
 - Bruising (ewes repelling alien lambs); mutilation of carcass (birds, dogs) ; drowned in river or swamp ; in hole ; caught in fence

- 9 **No cause of death found**
 - not any of above but most likely infection or metabolic disease
 - often due to a **failure to make a decision** ; use only as an absolute last resort

- 10 **Lamb missing**
 - Lamb was tagged at birth but not present at docking and no carcass found
 - When lambs are not tagged at birth these losses get combined with the losses from scanning to lambing and artificially inflates these losses.

- 11 **Metabolic disease**
 - Iodine deficiency : goitres on neck - enlarged thyroid gland
 - Selenium deficiency : white muscle disease usually needing veterinary diagnosis

(Source: T.Knight)

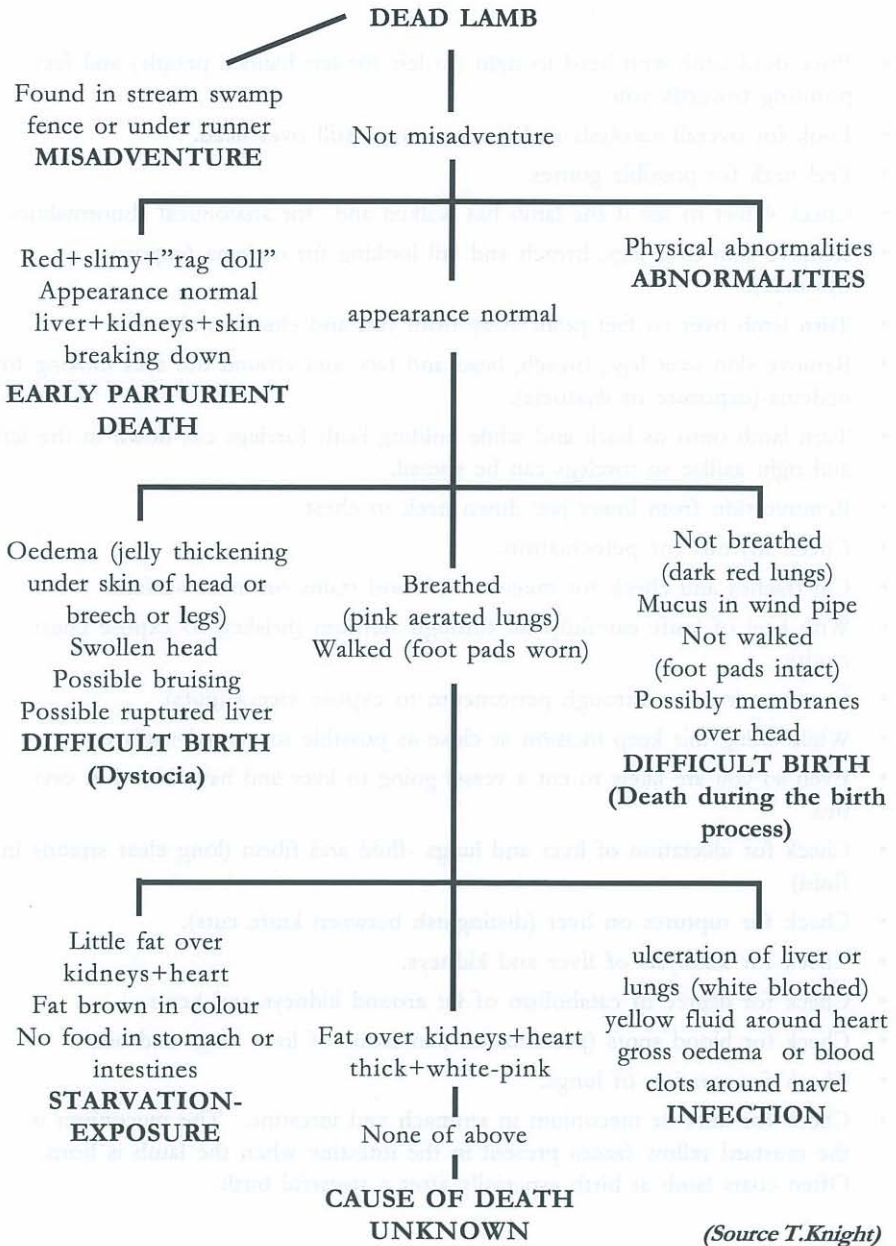
Appendix 2.1

DIAGNOSTIC PROCEDURE

- Place dead lamb with head to right (to left for left handed people) and feet pointing towards you.
- Look for overall autolysis and if membranes still over head.
- Feel neck for possible goitres.
- Check 4 feet to see if the lamb has walked and for anatomical abnormalities.
- Remove skin over legs, breach and tail looking for oedema (exposure or dystocia).
- Turn lamb over so feet point away from you and check as above.
- Remove skin over legs, breach, head and face and around the eyes looking for oedema-(exposure or dystocia).
- Turn lamb onto its back and while holding both forelegs cut down in the left and right axillae so forelegs can be spread.
- Remove skin from lower jaw down neck to chest.
- Check thymus for petechiation.
- Cut trachea and check for mucus and blood stains on inner surface.
- With heel of knife carefully cut through sternum (brisket) to expose chest cavity.
- Continue incision through peritoneum to expose viscera (guts).
- While doing this keep incision as close as possible to ventral surface.
- Even so you are likely to cut a vessel going to liver and have blood in cavities.
- Check for ulceration of liver and lungs -fluid and fibrin (long clear strands in fluid).
- Check for ruptures on liver (distinguish between knife cuts).
- Check for autolysis of liver and kidneys.
- Check for degree of catabolism of fat around kidneys and heart.
- Check for blood spots (petechiation) in tissue of liver lungs and heart.
- Check for aeration of lungs.
- Check for milk or meconium in stomach and intestine. The meconium is the mustard yellow faeces present in the intestine when the lamb is born. Often coats lamb at birth especially after a stressful birth.

Appendix 2.2

Post Mortem decision diagram



Appendix 3.0: Feed requirements of sheep.

Explanatory Notes:

These feeding tables give daily requirements of metabolisable energy in megajoules per day (MJ ME/d) for different levels of production.

The ME values in the tables can easily be converted to kilograms of dry-matter per day (kg DM/d) for different feeds using the ME feed values in Appendix 4.3 and the ready reckoner in Appendix 3.6.

For example the daily ME requirement to maintain weight for a 50kg ewe grazing mixed length leafy pasture with an ME content of 10.8 (from Appendix 4.3) would be 10 MJME/d (from Appendix 3.1). Using the ready reckoner in Appendix 3.6 this comes to 0.9 kg DM/d i.e. 10 MJ ME/d at a concentration of 11 MJ ME/kg DM. (see values circled on Appendix 3.1 and 3.6 for this example)

Appendix 3.1

ME requirements for maintenance and liveweight gain in mature ewes (MJ ME/d)

Liveweight gain (g/d)	Liveweight (kg)				
	40	45	50	55	60
Maintenance	8.5	9.0	10.0	11.0	11.5
50	11.0	12.0	13.0	14.0	14.5
100	13.5	15.0	16.5	17.0	18.0
150	16.0	18.0	20.0	20.5	22.0

Appendix 3.2

ME requirements of wether and ram lambs (MJME/d)

Liveweight gain (g/d)	Liveweight (kg)				
	20	25	30	35	40
0	6.5	8.0	9.0	10.0	11.0
50	8.0	9.5	11.0	12.0	13.5
100	9.5	11.0	13.0	14.5	16.0
150	11.0	13.0	15.0	16.5	18.5
200	12.5	14.5	17.0	19.0	21.0
250	14.0	16.5	19.0	21.0	23.5
300	15.5	18.0	21.0	23.0	26.0

Appendix 3.3

ME requirements of ewe hoggets (MJME/d)

Liveweight gain (g/d)	Liveweight (kg)				
	25	30	35	40	45
0	8.0	9.0	10.0	11.0	12.0
50	10.0	11.5	13.0	14.0	15.5
100	12.5	14.0	16.0	17.5	19.0
150	14.5	17.0	19.0	21.0	23.0
200	17.0	19.5	22.0	24.5	26.5

Appendix 3.4

ME requirements of ewes (MJME/d) during different stages of lactation

Liveweight (kg)	Single-suckling		Twin-suckling					
	week		week					
	1	3	6	9	1	3	6	9
40	12.0	23.0	20.0	18.5	23.0	26.0	23.0	20.0
45	21.0	24.0	21.0	19.5	24.0	27.0	24.0	21.0
50	24.5	28.5	24.5	20.5	28.5	32.0	28.5	22.0
55	25.0	29.0	25.0	21.5	29.0	33.0	29.0	23.0
60	26.0	30.0	26.0	22.0	30.0	34.0	30.0	24.0
65	27.0	31.0	27.0	23.0	31.0	35.0	31.0	25.0
70	28.0	32.0	28.0	24.0	32.0	36.0	32.0	26.0
Lamb pasture requirement	-	3.0	5.0	9.0	-	2.0	4.0	8.0

Note:

- (1) Each kg of ewe liveweight lost is equivalent to 17MJ ME while each kg of ewe liveweight gained requires an additional 65 MJ ME.
- (2) For triplets or quads add 1.0, 2.0 and 4.0 MJ ME/d for weeks 3, 6 and 9 respectively.

Appendix 3.5

ME required (MJME/D) during pregnancy by ewes, in addition to maternal requirements, for a lamb birth weight of 4kg.

Weeks before term	12	8	6	4	2	term
ewes	0.4	1.1	1.7	2.6	3.8	5.3

Note: Add 75% of these values for each additional foetus carried.

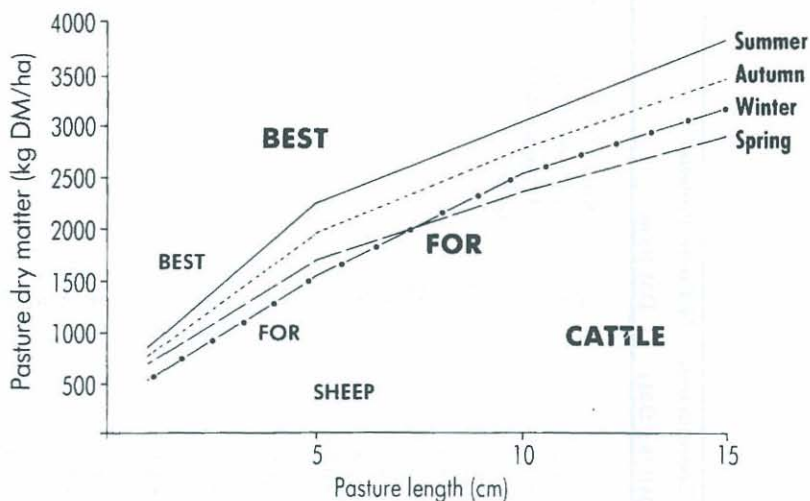
Appendix 3.6

Ready reckoner to convert metabolisable energy (MJ ME/day) to dry-matter (kg DM/day)

MJME/d	kg DM per day for different ME concentrations in feed					MJME/d	kg DM per day for different ME concentrations in feed				
	(MJME/kg DM)						(MJME/kg DM)				
	8	9	10	11	12		8	9	10	11	12
	kg DM/d						kg DM/d				
1	0.1	0.1	0.1	0.1	0.1	21	2.6	2.3	2.1	1.9	1.7
2	0.2	0.2	0.2	0.2	0.2	22	2.7	2.4	2.2	2.0	1.8
3	0.4	0.3	0.3	0.3	0.2	23	2.9	2.5	2.3	2.1	1.9
4	0.5	0.4	0.4	0.4	0.3	24	3.0	2.7	2.4	2.2	2.0
5	0.6	0.5	0.5	0.4	0.4	25	3.1	2.8	2.5	2.3	2.1
6	0.7	0.7	0.6	0.5	0.5	26	3.2	2.8	2.6	2.4	2.2
7	0.9	0.8	0.7	0.6	0.6	27	3.4	3.0	2.7	2.4	2.2
8	1.0	0.9	0.8	0.7	0.7	28	3.5	3.1	2.8	2.5	2.3
9	1.1	1.0	0.9	0.8	0.7	29	3.6	3.2	2.9	2.6	2.4
10	1.2	1.1	1.0	0.9	0.8	30	3.7	3.3	3.0	2.7	2.5
11	1.4	1.2	1.1	1.0	0.9	31	3.9	3.4	3.1	2.8	2.6
12	1.5	1.3	1.2	1.1	1.0	32	4.0	3.5	3.2	2.9	2.7
13	1.6	1.4	1.3	1.2	1.1	33	4.1	3.7	3.3	3.0	2.7
14	1.7	1.5	1.4	1.3	1.2	34	4.2	3.8	3.4	3.1	2.8
15	1.9	1.7	1.5	1.4	1.2	35	4.4	3.9	3.5	3.2	2.9
16	2.0	1.8	1.6	1.4	1.3	36	4.5	4.0	3.6	3.3	3.0
17	2.1	1.9	1.7	1.5	1.4	37	4.6	4.1	3.7	3.4	3.1
18	2.2	2.0	1.8	1.6	1.5	38	4.7	4.2	3.8	3.4	3.2
19	2.4	2.1	1.9	1.7	1.6	39	4.9	4.3	3.9	3.5	3.2
20	2.5	2.2	2.0	1.8	1.7	40	5.0	4.4	4.0	3.6	3.3

Appendix 4.1

Generalised seasonal conversion of pasture length to pasture dry matter for an average rye grass-clover pasture.



Appendix 4.2:

Minimum pasture length and dry matter quantities for different sheep production levels during the year.

	Pasture length(cm)	Pasture DM (kg/ha)	Feed intake (kg DM/d)	Production level
Ewes				
Mid pregnancy	1-2	400-500	1.0	Maintenance
6 weeks pre-lamb	2-3	600-800	1.3	60-80 g/d
Ewes and lambs	4-5	1400-1600	1.8	180-200g/d (lambs)
Summer	1-2	900-1000	1.0	Maintenance
Mating	2-3	1200-1400	1.4	120-150 g/d
Lambs				
Weaned- - spring	3-4	1200-1400	0.8	160-200 g/d
- summer	2-3	1400	1.0	130-150 g/d
- autumn	2-3	1200	1.2	80-100 g/d
- winter-spring	3	1100	1.2	100-120 g/d
Hoggets - summer	2-3	1400	1.3	60-80 g/d

Appendix 4.3

Nutritional value of different feeds

	% DM	*Relative ME Value on DM Basis	ME Concentration (MJME/kg DM)	% Crude Protein DM Basis	
<i>Pasture</i>					
Short leafy	15	1.1	11.7	27	*Relative ME values are relative to leafy pasture with a value of 1.0 (ME concentration of 10.8 MJME/kg DM)
Mixed-length leafy	18	1.0	10.8	21	
Dry stalky	28	0.8	8.1	10	
<i>Lucerne</i>					
Green vegetative	15-25	0.9	8.5-11.0	30	
Bud formation		0.8	8.5-9.5	25	
10-20% flowering		0.8	8.0-9.5	22	
<i>Silages</i>					
Lucerne	15-20	0.9	8.4-9.5	12-20	
Formic acid lucerne	19	0.8	7.1-8.5	21	
Wilted lucerne	19	0.8	8.0-9.5	21	
Maize	30				
	33	1.0	10.2-10.8	8	
<i>Hays</i>					
Pasture	Good quality	85	0.8	8.4	12
	Poor quality	85	0.7	7.3	12
Lucerne		85	0.8	8.0-9.5	17
<i>Straws</i>					
Oats		86	0.6	7.0	4
Wheat		86	0.5	5.7	3
Barley		86	0.7	7.1	5
Ryegrass		86	0.7	7.1-8.0	6
Pea		86	0.7	7.2	9
Corn stover		84	0.8	6.9-9.4	5

Crops

Swede tops	15	1.3	13.5	15
bulb	10	1.3	13.5	11
Turnip tops	13	1.3	14.1	20
bulb	9	1.2	12.9	12
Choumoellier	15	1.1	11.7	14
Rape	20	1.2	12.4	16
Kale	16	1.1	11.9	15
Mangels	13	1.1	11.9	10
Fodder beet	20	1.1	12.1	9
Carrots	13	1.2	13.0	9
Potatoes	24	1.2	12.6	8
Green maize	24	0.9	8.8-11.3	10
Lupins (sweet)	18	1.0	10.3	17
Fodder radish	11	1.0	11.5	10
<i>Green Feeds</i>				
Oats	17	1.2	13.0	15
Barley	17	1.2	12.5	15
Ryecorn	17	1.1	12.2	15
Wheat	17	0.9	9.5	15
<i>Concentrates</i>				
Wheat	86	1.3	13.5	14
Barley	86	1.2	13.1	12
Oats	86	1.1	12.0	13
Maize meal	86	1.3	13.9	10.
Linseed cake	86	1.1	12.0	26
Peas	86	1.2	13.1	26
Bran	86	0.9	9.6	17
Pollard	86	1.1	12.2	18
Brewer's grains	30-40	0.9	10.0	25
Molasses	75	1.1	11.8	4
Lucerne meal	86	0.9	9.5-10.3	22

Note: The feed values in Appendix 4.3 refer to the important components of energy and protein but it should be remembered that sheep also require a balance of vitamins, minerals and water. Fortunately good quality pasture contains about the right balance except where known mineral deficiencies such as selenium occur.

It is considered that energy is the main limiting feed component, hence its use for estimating feed quantities. As a rule, protein concentration of a sheep's diet should be around 6-8% for adult maintenance, 12-16% for young growing stock and at least 15% for lactating ewes.

Appendix 5:

Weight of gravid uterus for ewes

Stage of gestation	Ewes	
	single	twin (kg)
70	1.5	2.0
100	3.0	5.0
125	5.5	10.0
140	8.5	14.5

Appendix 6: Condition scoring of sheep

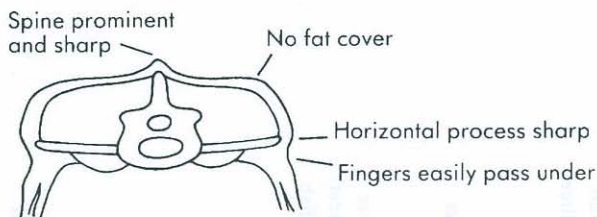
Explanatory notes:

Condition scoring of sheep assesses the amount of body fat or condition by feeling the vertical (spine) and horizontal processes along the loin area as shown in the diagrams below. The technique is valuable as it relates to production ability of sheep regardless of body weight eg. at 55kg liveweight a small framed ewe may have a condition score of 4, a large framed ewe a condition score of 2. As a rule for a given sheep there will be about a 5kg difference in liveweight between condition scores.

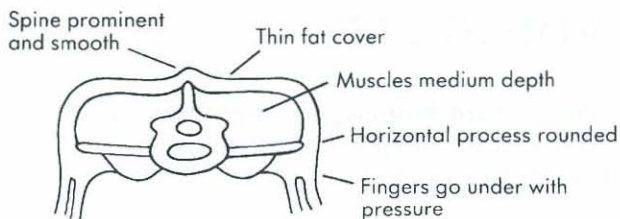
A. Condition scores 0, 1 and 2: indicate under feeding and low production

Score 0 This is seldom used as it only applies to ewes which are extremely emaciated and on the point of death. It is not possible to feel any muscle or fatty tissue between skin and bone.

Score 1 The vertical (spine) and horizontal (lumbar) processes are prominent and sharp. The fingers can be pushed easily below the horizontals and each process can be felt. The loin muscle is thin with no fat cover. **GR 0-5mm**

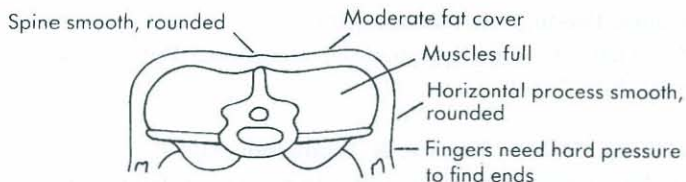


Score 2 The vertical processes are prominent but smooth, individual processes being felt only as corrugations. The horizontal processes are smooth and rounded, but it is still possible to press the fingers under. The loin muscle is of moderate depth but with little fat cover. **GR 5 - 8mm**

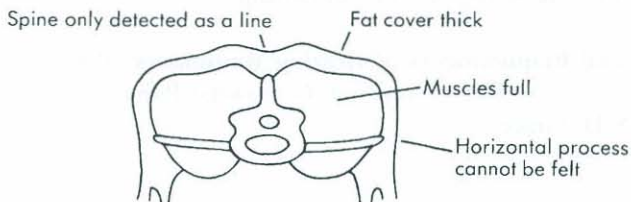


B. Condition scores 3 and 4: indicate good feeding and high production

Score 3 The vertical processes are smooth and rounded; the bone is only felt with pressure. The horizontal processes are also smooth and well covered; hard pressure with the fingers is needed to find the ends. The loin muscle is full, with a moderate fat cover. **GR 9 - 15mm**

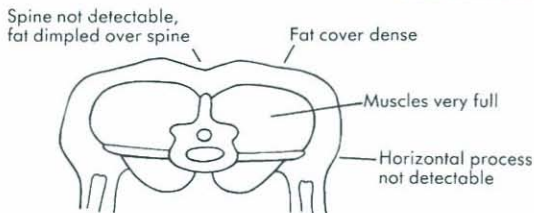


Score 4 The vertical processes are only detectable as a line; the ends of the horizontal processes cannot be felt. The loin muscles are full and have a thick covering of fat. **GR 15 - 20mm**



C. Condition Score 5 : overfed and overfat (GR over 21mm)

Score 5 The vertical processes cannot be detected even with pressure; there is a dimple in the fat layers where the processes should be. The horizontal processes cannot be detected. The loin muscles are very full and covered with very thick fat. **GR over 20mm**



READING LIST

- 1. A Guide to Feed Planning for Sheep Farmers** (1994)
A New Zealand Sheep Council Publication.
Editor: Dr Ken Geenty.
- 2. Reproductive Wastage in Sheep** (1996)
A Review and Report Commissioned by Wools of New Zealand & the New Zealand Meat Research and Development Council.
by Emeritus Professor B.W. Manktelow (copies available from Wools of New Zealand and the New Zealand Meat Producers Board).
- 3. Livestock Feeding on Pasture** (1987)
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- 4. The Sheep. Health, Disease & Production** (1994)
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- 5. Sheep Production: Vol. 1. Breeding and Reproduction** (1982)
Published by the New Zealand Institute of Agricultural Science.
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Editor: N.D. Grace.

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