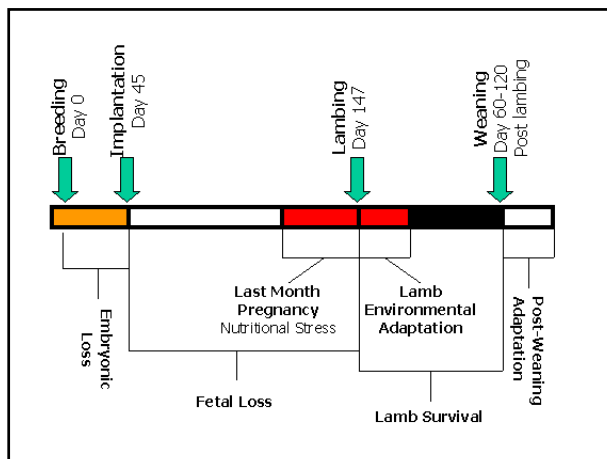


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 An alliance between Charles Sturt University and Industry & Investment NSW
 CHARLES STURT UNIVERSITY
 Industry & Investment NSW

Feeding Ewes and Reproduction

Michael Friend



Nutrition and conception

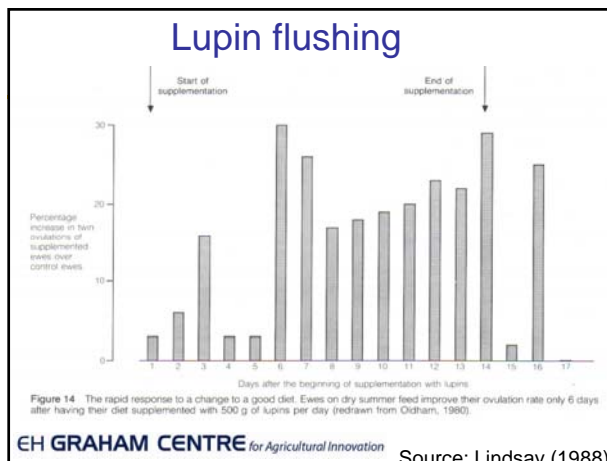
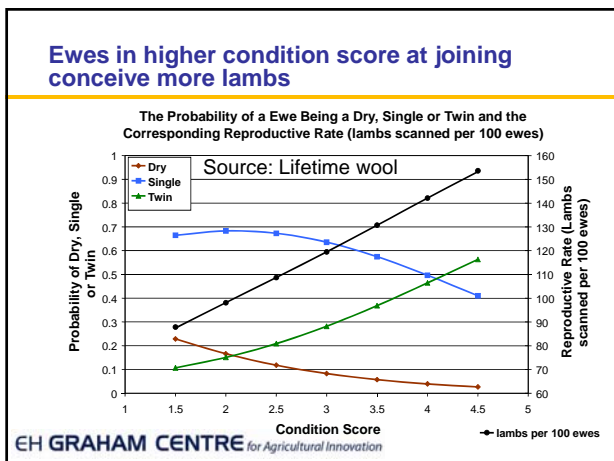
- oestrous start
- minimum liveweight (eg 40-45kg for medium framed merino)
- Minerals
- plant oestrogens

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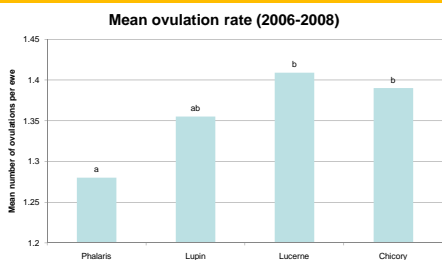
Nutrition and fecundity

- To **maximise** ewe fecundity
 - Join ewes in condition score 3
 - 1kg liveweight = 1.1% more lambs weaned
 - Rarely cost-effective to feed supplement to increase liveweight at joining
 - 'flushing' can increase ovulation

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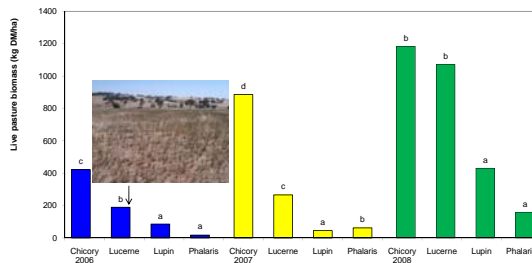
Live pasture is more effective than lupin grain for flushing synchronised ewes



Ovulation rate was increased by 10% on average, with low pasture availability (drought) (<1000 kg DM/ha) King BJ *et al.* (2010). *Animal Reprod. Sc.* (in press)

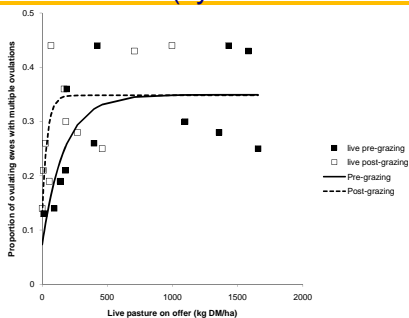
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Live pasture biomass pre-flushing



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Relationship between ovulation and live feed (synchronised ewes)



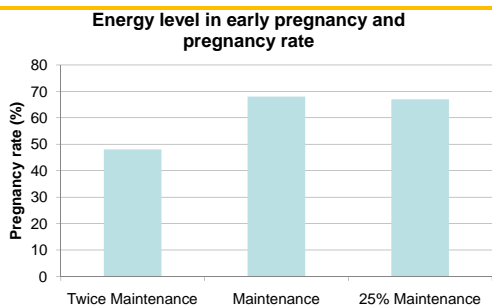
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Flushing unsynchronised ewes: 1 week pre + joining

	% twins Bookham 2009	% twins Jugiong 2009	% twins Wagga 2010
Lucerne	67	44	66
Dry pasture	20	34	65

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Too much of a good thing?



EH GRAHAM CENTRE for Agricultural Innovation Parr RA *et al.* (1987). *J. Reprod. Fert.* **80**, 317-320

Making flushing work in practice

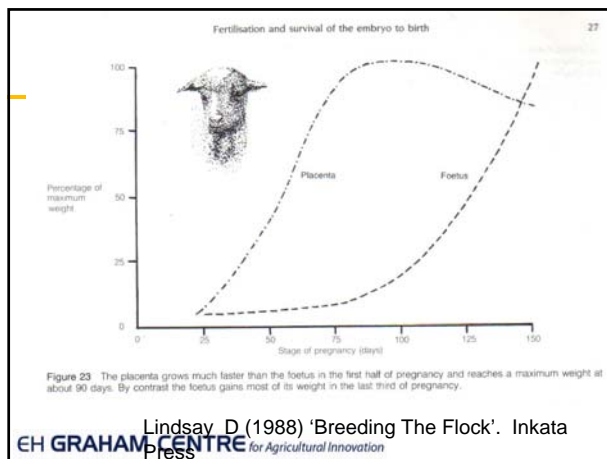
- Put ewes on green feed a week prior to joining
 - If enough green feed leave on for first week
- Can leave on for longer, but **large amounts of high quality** feed 10 days into pregnancy can cause abortion
- Needs to be accompanied by increased survival of twins
 - If scanning % increased from 130 to 143%
 - Twin survival of 50% means only 6 extra lambs/100 ewes joined
 - Twin survival of 80% means 10 extra lambs/100 ewes joined

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Pregnancy and nutrition

- Maintain CS to day 90 to allow placental growth
- Preg scanning will allow separate feeding/management of dry/twins
 - more useful in poor seasons with high feeding rates

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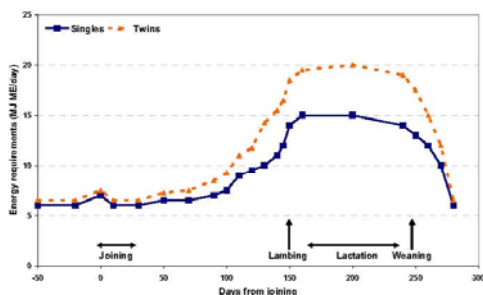


Figure 2: Energy requirements of single and twin bearing ewes (Source: Hall, 1991)

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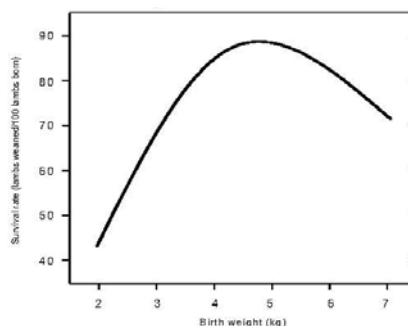


Figure 2: Relationship between lamb birth weight (kg) and survival (number of lambs weaned per 100 lambs born). (Source: Atkins 1980)

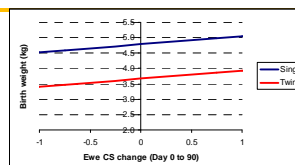
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Nutrition effects on birth weight

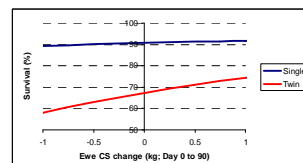
- Depends on
 - Level of restriction
 - Timing of nutrition
 - D50-90 can affect placental weight
 - Can be influenced by BCS
 - Protein levels
 - Age of ewe
- Last trimester
 - Fat ewes in energy deficit buffer fetal growth better
 - Thin ewes may eat more but partition to maternal LW

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Nutrition during early pregnancy



Source: Lifetime wool

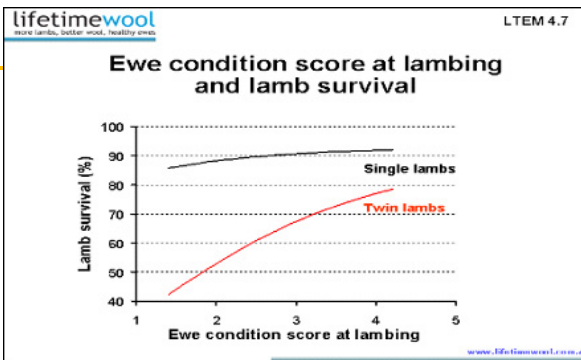


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Lamb survival and nutrition

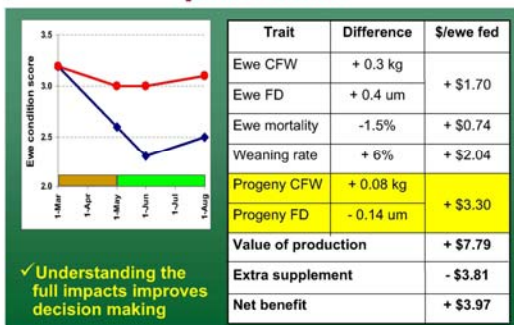
- To maximise ewe and lamb survival
 - Manage twin-bearers separately and aim to have them in condition score 3 to 3.5 at lambing
 - Aim for 1.2T/ha (singles) or 1.8 T/ha (twins) green feed
 - Avoid having over-fat ewes at lambing
 - Be aware of metabolic disorders around lambing

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Conditions score profile and lifetime performance



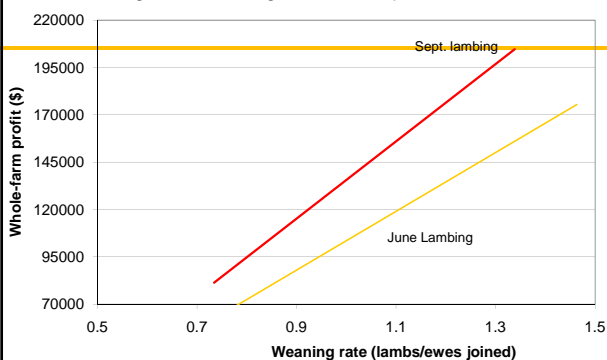
EH GRAHAM CENTRE for Agricultural Innovation Source: Lifetime wool

Take Home Messages

- Join in BCS 3 where possible and maintain through pregnancy
- Consider 'flushing' to increase twins
- Separate twin bearers to manage more closely
- Lamb twins in BCS 3

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Lambing time, weaning % and farm profit for Tarcutta

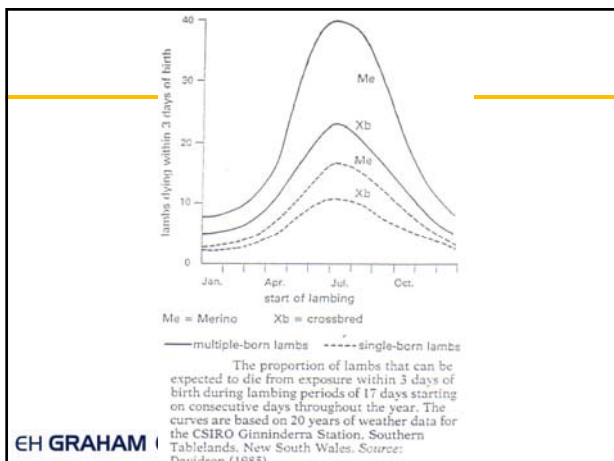
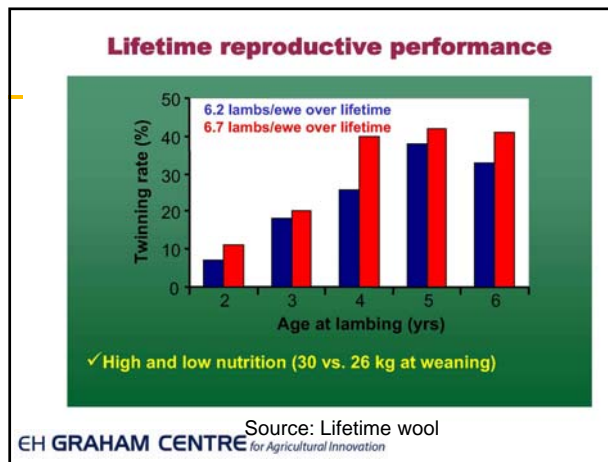
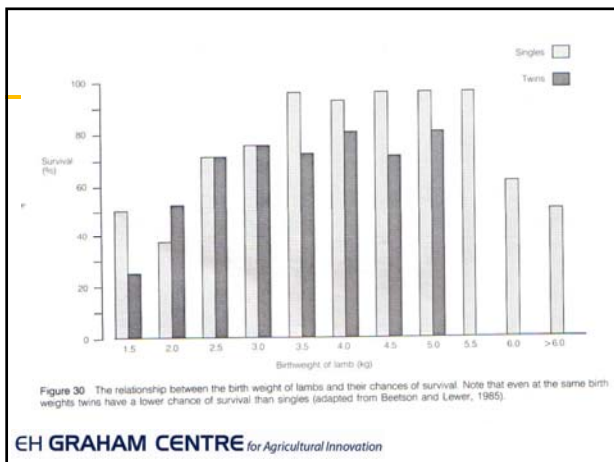
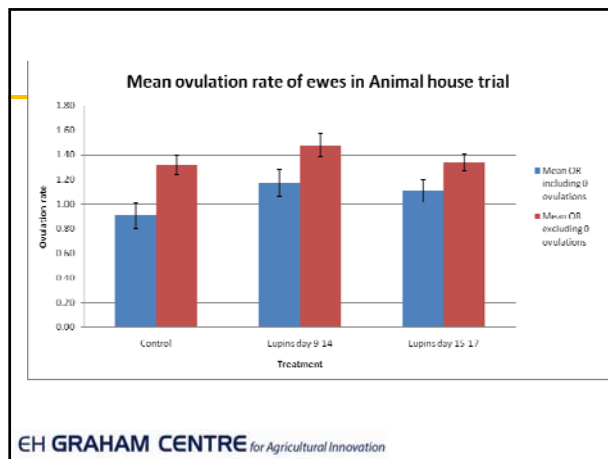
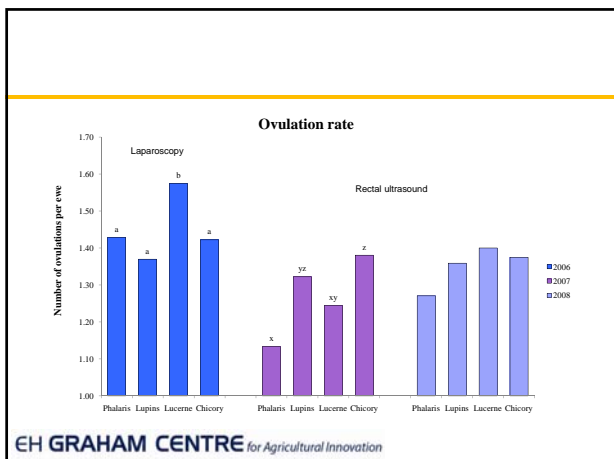


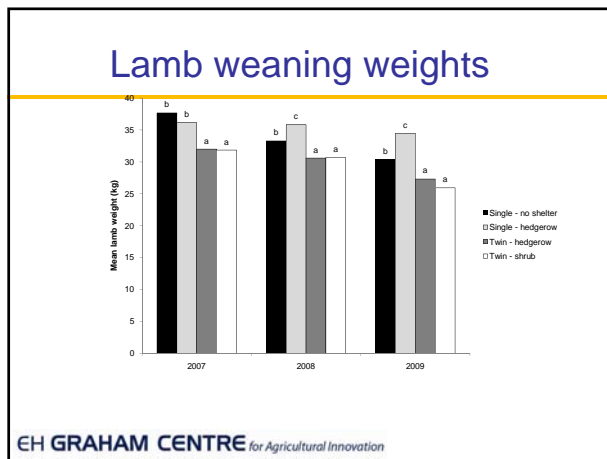
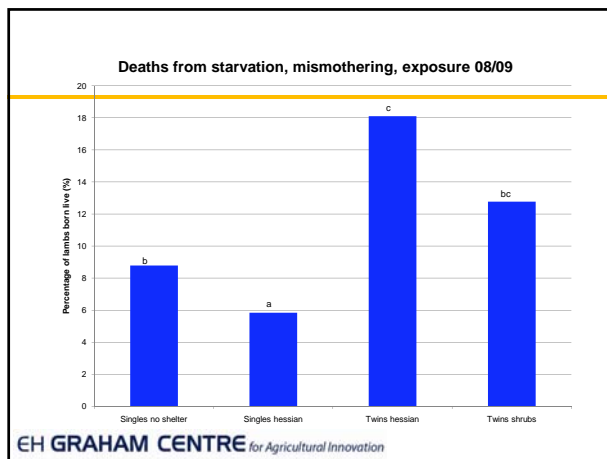
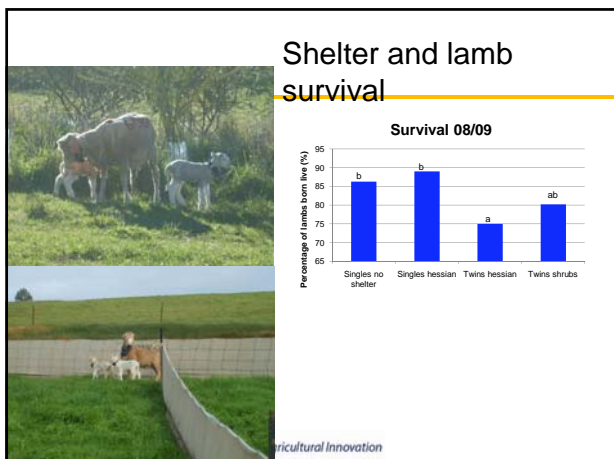
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Other nutritional stresses

- Phosphorus (eg Cattle in Qld)
 - No benefit above 0.36% P
- Vitamin E/Se
 - Plasma Se 0.08-0.12ppm
- Vitamin A and beta-carotene
 - Steriodogenesis and embryo survival
- Copper deficiency/molydenum excess
- Zinc
 - Ewe fertility and fecundity

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- ### Shelter to increase survival
- Benefit depends on location and lambing time
 - Nutrition still most important
 - Target twin-bearers
 - Lamb in at least CS3
 - Consider separating into early and late lambing for shelter
 - Shelter an insurance
 - May not see benefit in survival every year
 - Use existing shelter
 - If designing shelter, consider economics, prevailing winds and potential other benefits
- EH GRAHAM CENTRE for Agricultural Innovation

Does nutrition affect birth weight?

Study	Breed and age	Treatment	Birth weight effect
Moore et al. (1986)	5yo Romney	H/L last 6 weeks	None
Holst et al. (1986)	?yo BLM	H (>600kg/ha)/L (<100kg/ha) weeks 6-15 or 15-20	L in late preg lowered
Arnold et al. (1977)	?yo Merino	0, 150, 300 or 500g lupins in last 4wks	None
Kenny (1985)	2.5-3.5yo BLM	Drought rations of wheat with or without roughage or lupins late preg	Lupins increased
Stephenson and Bird (1992)	?yo merino	Rhodes grass 800g/d with or without CSM and molasses late preg	CSM and molasses increased

Study	Breed and age	Treatment	Birth weight effect
Watson and Egan (1985)	6yo merino	Wheat or wheat +protein/roughage in late preg	Protein and barley straw increased
Parr et al (1986)	Multiparous merino	D0-35 0.5M or 1.5M	None
McCrabb et al. (1992)	4-5yo Corriedale	Mid preg restriction	None
McNeill et al. (1998)	?yo Merino	Lean v fat ewes d110 onwards ad libitum	None
Davis et al. (1981)	Mature Coopworths	H or L d 40-95 or d95 onwards	None

Study	Breed and age	Treatment	Birth weight effect
Faichney and White (1987)	2yo Corriedale	Moderate restriction d50-100, d100-135 or d 50-135	D50-135 lower
Oddy and Holst (1991)	3-4yo BLM	4 week restriction at d79, d87 or d95	None
Russell et al. (1981)	18mo Scottish Blackface	Poor vs good condition fed L or H in mid preg	H nutrition reduced BW of good condition but increased for poor
Robertson (2000)	Adult merino	L, M or H at various stages	High throughout greater than low throughout

Study	Breed and age	Treatment	Birth weight effect
Mulvaney et al. (2008)	Romney ewe lambs	L, M and H throughout	L reduced
Conner et al. (2008)	Adult twin Romneys	L or H in mid or late preg	H throughout greater than L throughout
Kerslake et al (2008)	Romney adults with twins	L v H pasture with or without 400g grain	H pasture with 400g grain slightly increased in 1 year

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Additional slides

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Excess protein and fertility

Figure 1. The relationship of plasma urea nitrogen (PUN) to pregnancy rate for first AI in lactating dairy cows (n = 160).

Butler et al. (1996). J. An. Sc. 74, 858

Sheep

Table 6 Mean \pm s.e. ovulation rate and embryo development in superovulated donor ewes at embryo transfer and fetal development and survival in recipient ewes at slaughter.

Diet	Control	Urea
Donor ewes	30	25
No. of embryos recovered	4.9 \pm 0.6	4.4 \pm 0.6
No. of embryos with more than eight cells	82/147 (56%) ^a	39/109 (36%) ^b
Recipient ewes		
No.	32	34
No. pregnant at day 34-36	24/32 (75.0%)	28/34 (82.4%)

Within rows ^{a,b} P < 0.05. From: Fahey et al. (1998).

Fahey et al. (1998). Proc BSAS p128

In beef cows, no effect of high urea feeding on pregnancy rate or embryo quality (Gath V et al. 1999. The Veterinary Record, 51, 224)

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Effect of 200% energy on fertility

Table 1. The influence of level of nutrition and progesterone supplement (CIDR Days 8-14 after mating) on the percentage of ewes pregnant and the percentage of fetuses per ewe pregnant.

Level of nutrition	Ewes pregnant (%)		Fetuses/ewe (%)	
	Control	CIDR	Control	CIDR
High	48 ^{**}	76 ^{**}	132	132
Medium	68 [*]	65 [*]	135	150
Low	67 [*]	60 [*]	129	148

Different superscripts denote significant differences: a, b: P < 0.05; x, y: P < 0.01.

Table 2. Peripheral plasma progesterone concentrations on Day 12 after mating from ewes fed high, medium or low levels of nutrition on Days 2-14 after mating and treated with exogenous progesterone (CIDR) on Days 8-14 after mating.

	Level of nutrition		
	Low	Medium	High
Control ewes	3.2 \pm 0.20 (55)	2.0 \pm 0.20 (55)	1.5 \pm 0.16 (54)
CIDR-treated ewes	5.4 \pm 0.34 (51)	4.2 \pm 0.32 (55)	2.8 \pm 0.20 (55)

Values are mean \pm s.e.m. for the no. of ewes in parentheses (5 samples lost during centrifugation).

Parr RA et al. (1987). J. Reprod. Fert. 80, 317-320

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