Nutrition during pregnancy: management and consequences

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Did you know?

- Pregnancy nutrition is the foundation influencing profitability of grass-based systems of prime-lamb production because it impacts:
  - lamb mortality – 60% occurs within 24 hours of birth
  - birth weight: each 0.5 kg increase in birth weight
    -increases weaning weight by 1.6 kg
    -reduces age at slaughter by ≈ 10 days
  - colostrum production - intake within hours after birth influences survivability
  - ewe condition score at lambing
    -influences partition of nutrients during lactation
    -for 2 year olds has positive effect on lifetime productivity

Late pregnancy nutrition - influences:
- number and weight of lambs reared per ewe joined
- flock profitability

Objective of this presentation

- Present:
  1) nutrient requirements of ewes during late pregnancy
  2) results from Athenry on the effects of nutrition during pregnancy on ewe and lamb performance
  3) practical management guidelines

Background to studies

All sheep: - managed in a grass-based system
- shorn at housing
- triplets got concentrate pre-weaning

Shearing at housing – the benefits

Effect of shearing ewes at housing on performance

	Shearing date	
	May	Mid December
Ewe condition at lambing	3.5	3.4
Lamb birth weight (kg)	4.1	4.7
Lamb weaning weight	31.5	33.4

(Keady and Hanrahan 2008, 2009; Keady et al 2007)

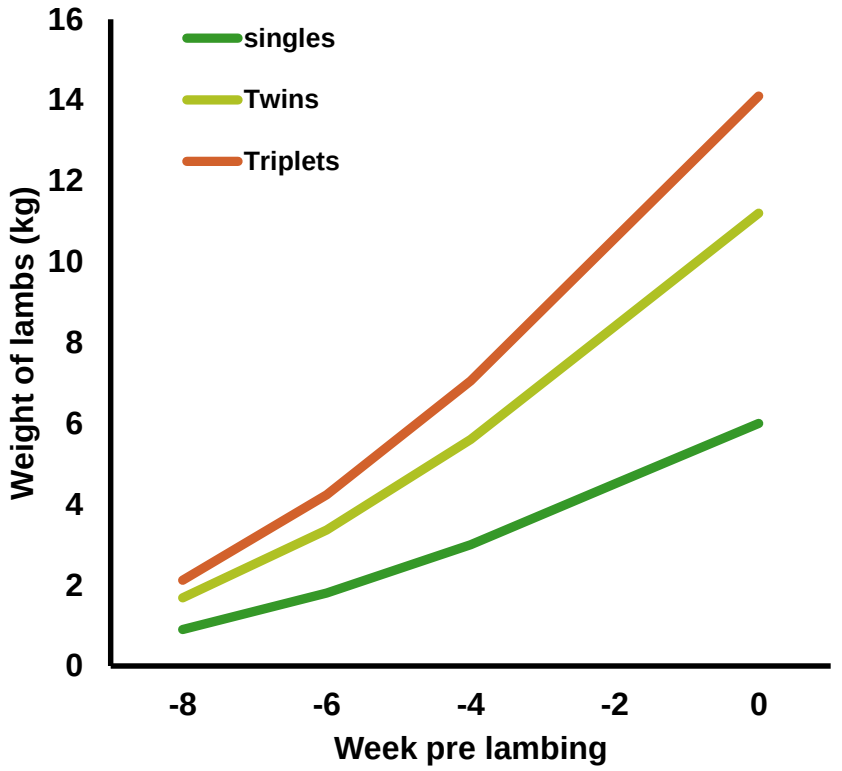
Response to shearing at housing equivalent to:

- **reducing age at slaughter by 2 weeks**
- **≈ 19 kg concentrate per lamb pre-weaning**
- **≈ €14/ewe rearing 1.7 lambs**

Foetal development

- Mean duration of pregnancy ≈ 147 days
- Placenta developed by day 90
- Final 6 weeks of pregnancy
  - 70% of foetal growth occurs
  - rapid increase in nutrient requirements

Foetal growth during late pregnancy



Ewe nutrient requirements

Factors affecting ewe nutrient requirements:

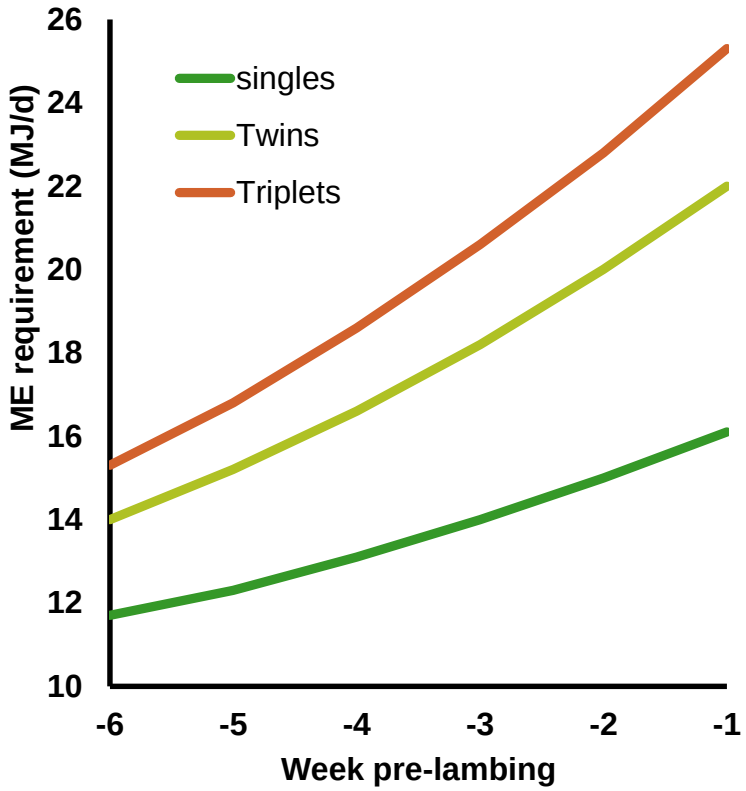
- Litter size
- Stage of pregnancy
- Ewe weight

ME requirements of an 80kg ewe in late pregnancy (MJ/day)

Litter size	Week pre-lambing					
	6	5	4	3	2	1
1	11.7	12.3	13.1	14.0	15.0	16.1
2	14.0	15.2	16.6	18.2	20.0	22.0
3	15.3	16.8	18.6	20.6	22.8	25.3

(AFRC 1993)

ME requirement - 80 kg ewe



Rapid increase in energy requirements in late pregnancy

Ewe protein requirements

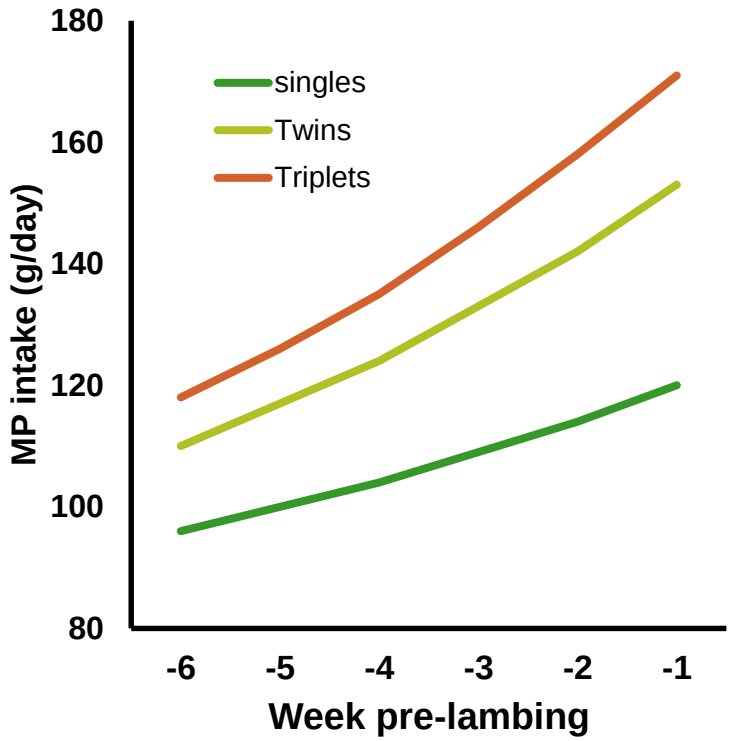
- Crude protein = nitrogen x 6.25
- 2 types of protein
  - readily broken down in the rumen (ERDP)
  - passes the rumen, digested in intestine (DUP) } MP

Metabolisable protein requirements 80kg ewe (g/day)

Litter size	Week pre-lambing					
	6	**5**	**4**	**3**	**2**	**1**
1	96	100	104	109	114	120
2	110	117	124	133	142	153
3	118	126	135	146	158	171

(AFRC 1993)

MP intake – 80 kg ewe



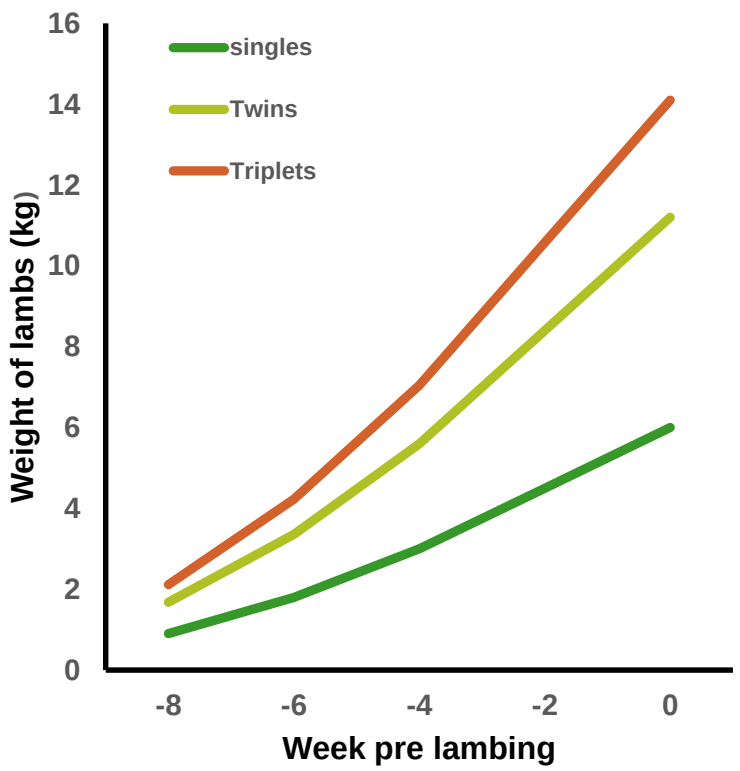
Rapid increase in protein requirements in late pregnancy

Ewe nutrient requirements - summary

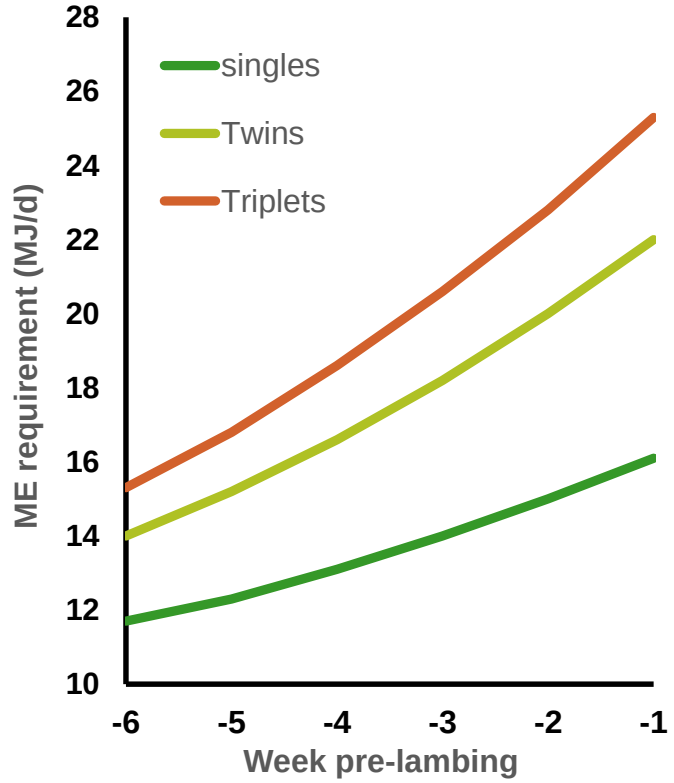
Factors affecting ewe nutrient requirements

- Litter size
- Stage of pregnancy
- Ewe weight

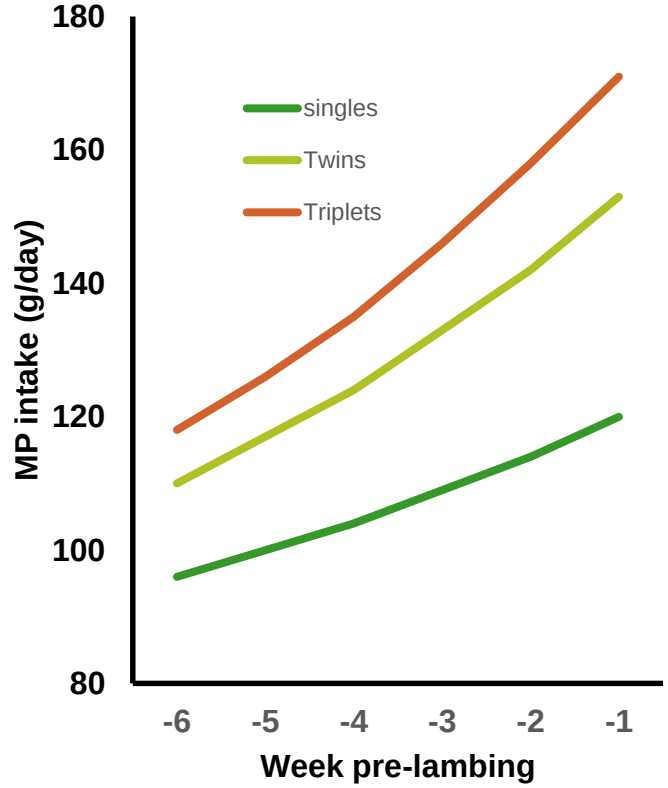
Foetal growth



ME requirement



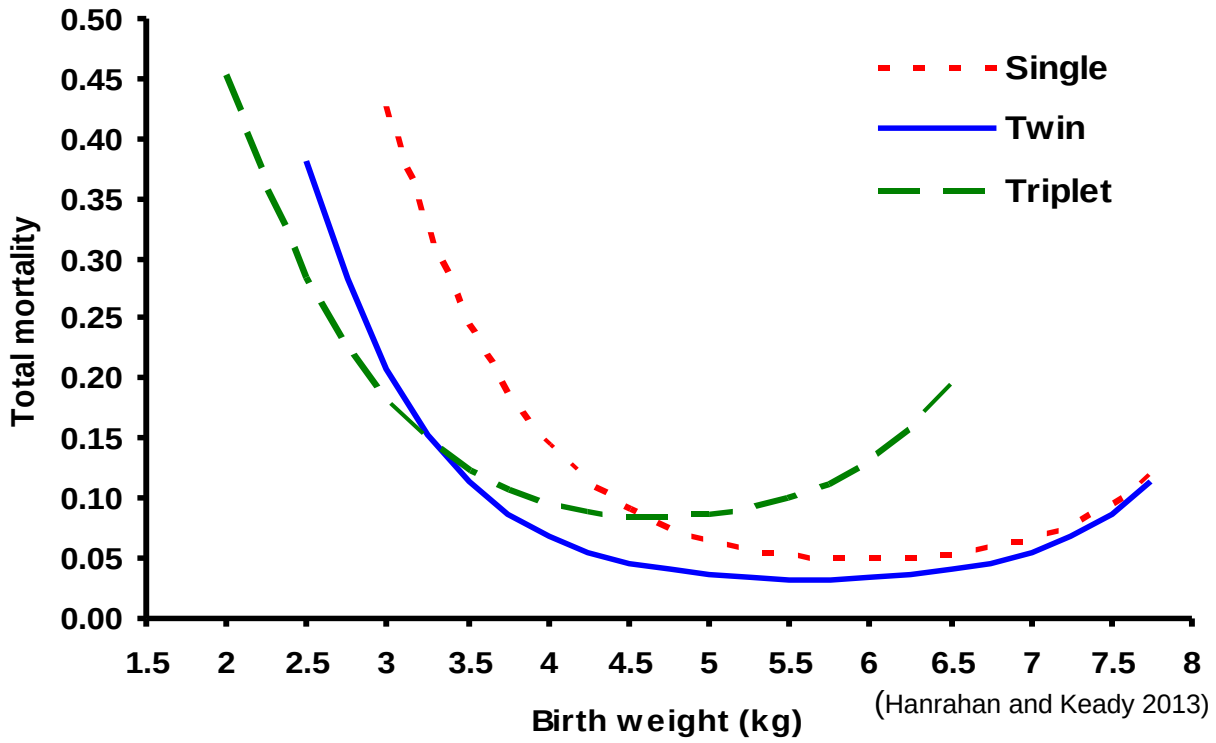
MP requirement



- **Rapid increase in energy and protein requirements in late pregnancy**
- **Meet requirements or face the consequences**

Lamb birth weight – effect on lamb mortality

- 60% of lamb mortality occurs within 24 hours of birth
  - 19% due to dystocia



(Hanrahan and Keady 2013)

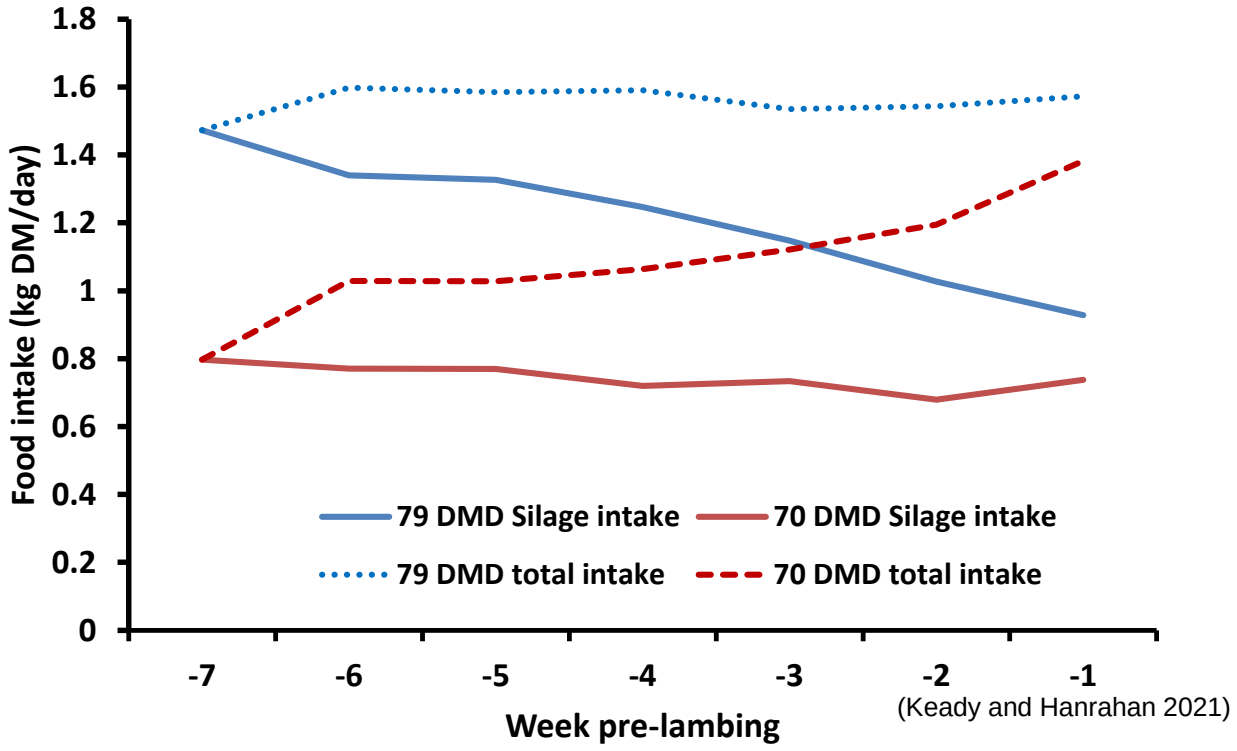
Optimum birth weight (kg): - single 6.0

- twin 5.6 (0.93 that of a single)

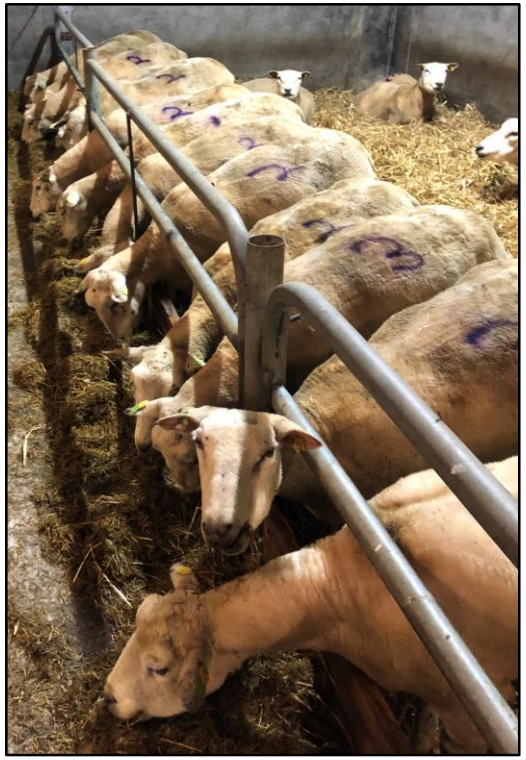
- triplet 4.7 (0.78 that of a single)

Effect of silage feed value on intake

Effect of silage feed value and concentrate on food intake in late pregnancy



(Keady and Hanrahan 2021)



Concentrate replaces high feed-value silage

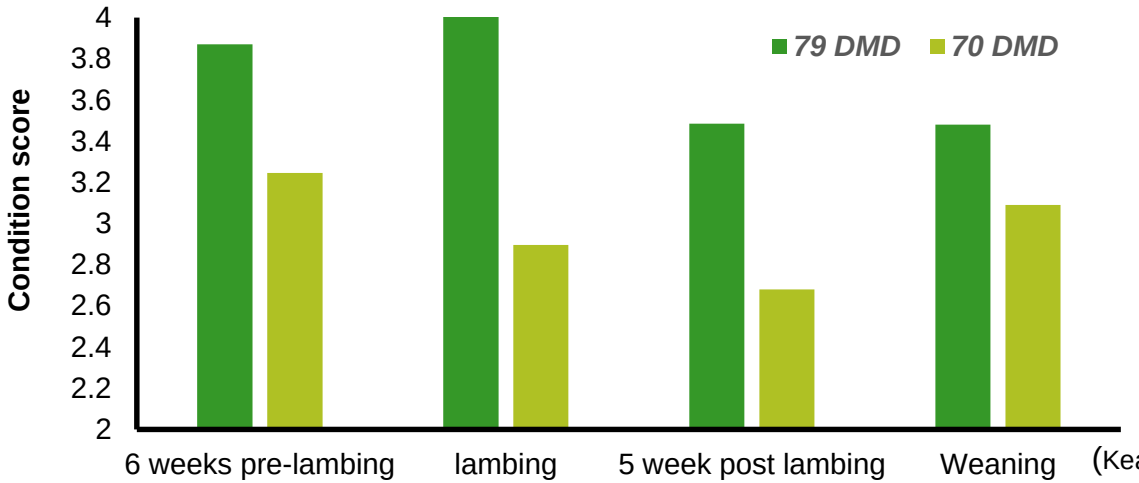
Effect of silage feed value

		Silage feed value (DMD %)		
		79		70
ME intake (MJ/day)		19.1		12.5
Ewe BCS at lambing		4.0		2.9
Lamb weight (kg) -	birth	5.1		4.6
	weaning	33.7		31.8

*20 kg conc

(Keady and Hanrahan 2021)

Effect of silage feed value on ewe condition score



(Keady and Hanrahan 2021)

Response equiv. to 19 kg conc/lamb = €14/ewe rearing 1.75 lambs

Effect of silage feed value

		Silage feed value (DMD %)	
		75	69
Ewe BCS at lambing		3.4	2.6
Failed to lamb (%)		1.0	6.6
Lamb weight (kg) -	birth	4.4	4.0
	weaning	29.3	28.1

*2 tooth ewes

(Keady and Hanrahan 2018)

Each 5% unit increase in DMD of silage increases:

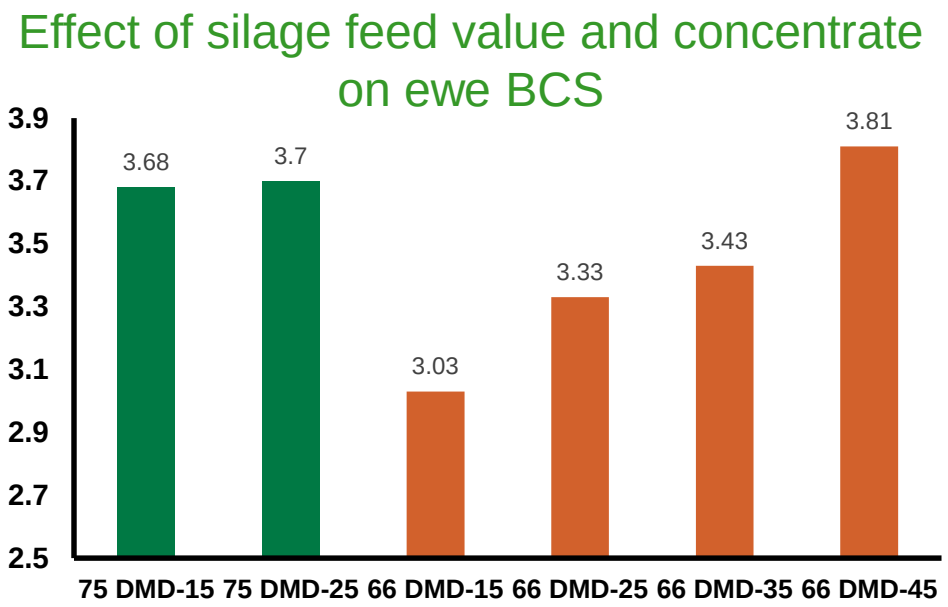
- ewe weight at lambing by 6 kg
- ewe body condition score
- lamb weight at birth by 0.3 kg
- lamb weight at weaning by 1 kg

Producing high feed value silage

- **Digestibility is King**
  - ***Date of harvest***
    - DMD declines by 3.3% units for each week delay in harvest
    - rate of decline similar for primary growth and regrowth
    - require an additional 1.2 kg conc per beef animal
  - ***Crop lodging*** - digestibility declines by up to 9% units/week
  - ***Silage fermentation*** - poor fermentation reduces DMD
  - ***Wilting*** - rapid wilt ensile after 24-36 hours
    - prolonged wilting reduces DMD by up to 2% units per 24 hours
  - ***Chop length*** – precision chopping increases silage intake **but digestibility is King**

High feed value silage delivers - make the effort

Effect of silage feed value on response to concentrate



Effect of silage feed value on response to concentrate supplementation

		Silage feed value (DMD %)					
		74		66			
Concentrate (kg)		15	25	15	25	35	45
Lamb weight (kg)	- birth	5.0	5.1	4.7	5.2	5.4	5.3

(Keady and Hanrahan 2010)

Effect of protein source on performance

		Protein source	
		Soybean	By-products
Ewe BCS at lambing		2.8	2.8
Lamb weight (kg) at -	birth	4.0	3.7
	weaning	30.9	30.0

(Keady and Hanrahan 2012)

- Concentrates contained similar crude protein and energy concentrations
- Response to soybean concentrate similar to offering 75% extra by-product concentrate
- Each €20/tonne increase in concentrate prices = 50cents/ewe

Concentrate requirements of twin-bearing ewes in late pregnancy (kg/ewe)

	Silage feed value (DMD %)		
	75	70	65
Precision chop	12	20	27
Big bale/single chop	16	25	33

Singles: reduce by 5 kg; Triplets: increase by 8 kg

- Group ewes according to - litter size
  - lambing date
- Step up concentrate level in late pregnancy

Value of feedstuffs

	Cost (€/t)	Value (€/t)
Barley	263	263
Wheat	274	263
Maize	267	280-305
Gluten	323	302-323
Beet pulp	300	246
Soya hulls	278	265
Soya	561	561
Rapeseed	369	466
Maize distillers	337	400

Composition of concentrate for 2024

	kg/t
Maize meal	300
Soya bean meal	180
Soya hulls	175
Rapeseed	100
Barley	80
Maize distillers	60
Beet pulp	50
Molasses	30
Minerals	25

Crude protein – 19%
ME – 13.0 MJ/kg DM
DUP – 80 g/kg DM

Feed management
Feed space: 0.5-0.6 m/ewe
Split feeds

Pregnant ewe lambs

Pregnant ewe lambs:

- requirements for maintenance, pregnancy and growth
- require more energy intake relative to mature ewes of similar weight
- high feed value silage plus 0.25 kg concentrate from housing
- during late pregnancy: same quantity of concentrate as mature ewes

Ewe lambs rearing:

- singles require no concentrate
- twins should be treated as adult ewe rearing triplets

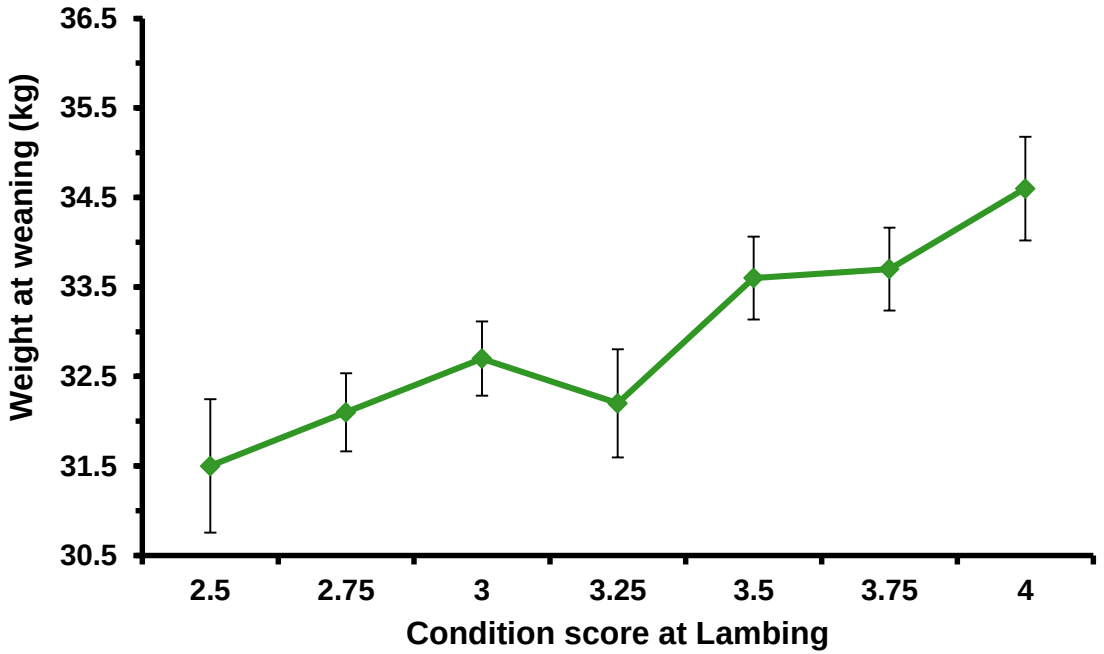
Developing a nutrition plan

- Requires the following information:
  - expected lambing date – raddle colour
  - litter size
  - silage analysis - mean DMD = 69% (range 52-82%)
    - to determine concentrate requirement
  - group ewes according to feed requirement

Daily concentrate allowance (kg/ewe) for different total concentrate inputs pre lambing

Week prior to lambing	Desired total concentrate prior to lambing (kg)					
	10	15	20	25	35	45
8					0.3	0.4
7				0.3	0.3	0.6
6		0.2	0.3	0.3	0.4	0.6
5		0.2	0.3	0.4	0.5	0.8
4	0.2	0.2	0.4	0.4	0.7	0.9
3	0.2	0.3	0.5	0.6	0.8	1.0
2	0.4	0.5	0.6	0.7	1.0	1.0
1	0.6	0.75	0.8	0.9	1.0	1.1

Effect of BCS at lambing on lamb performance



- Data from 464 ewes rearing **TWINS**
- Each 1 unit increase in BCS at lambing increases lamb weaning weight by 1.8 kg
- Extra 1 unit for 2 y.o. ewes significantly increases lifetime output +0.8 lamb

Conclusions

- Pregnancy nutrition is the foundation of flock profitability because it impacts
  - lamb mortality, growth rate, age at slaughter
  - ewe condition, lactation
  - grazing requirements post weaning
- Shearing increases lamb weaning weight: ≈ 19 kg concentrate/lamb (≈ €14/ewe)
- Increase of 5% units in silage DMD increases ewe weight at lambing by 6 kg & lamb weaning weight by 1 kg.
- Response to concentrate depends on silage feed value
- 0.5 unit increase in ewe condition at lambing increases lamb weaning weight by 1 kg
- Concentrate
  - 19% protein
  - purchase on ingredient composition i.e. soya, rapeseed, maize, barley, soya hulls, beet pulp
- Develop a nutrition plan to meet ewe requirements
- Plan now to increase DMD of next year's silage by 5% units