

Management of ewe lamb replacements: effects on breeding performance and lifetime productivity

J P Hanrahan

Formerly:

Teagasc
Athenry Research Centre
Galway, Ireland

Now:

sjohanrahan@gmail.com

Outline of presentation

- Issues related to puberty and pregnancy rate
- Management of ewe lambs through pregnancy
- Management post lambing
- Effect of rearing regimen on adult performance
- Impact of lambing at 1 year on lifetime performance and output

Ewe lambs: overall role

- **Role of ewe lamb replacements depends on the environment and system**
- **Thus: less emphasis in**
 - Wool production systems
 - Hill environments
- **Important in meat production systems where nutritional base is good**
- **Breeding from replacements is often not practiced – for a variety of reasons:**
 - stratified breeding structure
 - variable reproductive performance
 - workload

Puberty & Conception

- **Birth date**
- **Live weight at onset of the breeding season**
- **Ewe lambs intended for breeding should be at least 60% of mature weight prior to joining**
- **Conception rate per oestrous cycle is significantly lower in ewe lambs than adult ewes (Quirke et al, 1983)**
- **Important that ewe lambs come in oestrus early in the joining period.**

Factors affecting pregnancy rate in ewe lambs (Kenyon et al 2004, 2005, 2006, 2008)

- **Positive relationship between live weight at joining and probability of oestrous within first 17 days of the joining period**
- **Exposure to vasectomised rams prior to joining increased reproductive performance**
 - **Proportion mated, and pregnant, within 17 days**
 - **Overall pregnancy rate**
 - **Litter size**
- **Adult rams rather than ram lambs; do not mix with adult ewes for joining**
- **Ram to ewe ratio – lower than for adult ewes**

Live weight of ewe lambs and pregnancy rate

Source	Weight difference (kg)	Pregnancy rate (%)
Keane (1975)	3.5	86 v 80
McCann (1986)	12.0	79 v 40
McCann et al. (1989)	8.1	92 v 88
Yoder (1990)	6.7	77 v 58
Fogarty et al . (2007)	5.5	63 v 47

But - very high growth trajectory to early pregnancy can impair reproductive performance & subsequent lactation performance



Shearing prior to joining

- **Conflicting evidence on benefits under temperate husbandry conditions typical of British isles (fertility: 79% v 78%; 89% v 73%; 88% v 72%)**
- **Very large effects reported under Icelandic husbandry conditions** (housed from joining to lambing in May).
 - study over 3 seasons: Fertility 83% v 48% **(65%)**
Thorsteinsson & Thorgeirsson (1989)
- **On-farm study in Ireland (Lynch 2011) yielded the following response to shearing:**
 - No effect on pregnancy rate, litter size or lamb survival
 - Significant improvement in lamb birth weight
 - Unshorn ewes had higher incidence of assistance at lambing

Effect of protein and energy on lamb birth weight and maternal body weight

ME intake	Protein intake (g/day)		
	110	165	228
Low (8 MJ/day)	2.8 (43.5) [†]	3.3 (45.6)	3.2 (45.9)
High (12.5 MJ/day)	3.2 (50.3)	2.8 (53.7)	2.5 (53.7)

Quirke et al (1978) [†]Maternal live weight post partum

Significant Energy x Protein interaction for birth weight

Management of ewe lambs through pregnancy

- **Feeding during early pregnancy significantly affects pregnancy rate**
 - **Annett & Carson (2006) (days 1 to 31)**
 - 2xMaintenance ... 59% lambed**
 - 1xMaintenance ... 61% lambed**
 - 0.6xMaintenance ... 82% lambed**
 - **Mulvaney et al (2008) (days 5 to 38)**
 - High (LW +9 kg) ... 46% @ day 50**
 - Medium (LW +5 kg) ... 66% @ day 50**
 - Low (LW +1 kg) ... 62% @ day 50**
 - Continued High & Low ... negative impact on fetal survival**
 - 28% & 32% lost pregnancy vs 3% for Medium**

Results from Kenyon et al 2008 – not quite consistent with above

Management of ewe lambs through pregnancy (Mulvaney et al.,2008 cont'd)

Group‡	LW Gain* (kg)	Lambled (%)	B.wt. (kg)	Lamb survival(%)
High	28.4	30	4.0	85
Medium	15.7	64	4.0	53
Low	8.6	42	3.5	36

‡ L regime continued to day 100 post mating, while H & M were continued to lambing

*To day 129 of pregnancy

Relative to M, the weight of lamb weaned per ewe joined was 39% and 71% for L and H, respectively

Effect of ewe lamb live weight on performance of progeny (Schreurs et al. 2010)

	Change per extra 1 kg in maternal live weight at given day of gestation		
Day of gestation	Birth weight (g)	Weaning weight (g)	Dam weight @ weaning (kg)
	Single, Twin	Single, Twin	Single, Twin
0	15, 71	327, 689	1.36, 0.88
50	9, 37	248, 471	1.09, 0.74
100	5, 23	144, 267	0.83, 0.52

Best to have extra weight at joining rather than later

Effect of growth trajectory of ewe lambs on lactation performance

- McCann (1986) – three feed levels from weaning (~120 days) to end of joining ...
 - **No effect on subsequent milk yield or progeny growth**
- McCann et al. (1989) – High and Low feed levels from 42 days of age...
 - **Significantly higher milk production by Low plane ewes; differences in mammary duct area in same direction**
- Umberger et al. (1985) – High and Low feed levels from early weaning to breeding;
 - **milk yield was 19% higher to 40 days of lactation for Low and these ewes had more alveoli in mammary tissue than High**
- Consistent with results of Johnson & Hart (1985)

High lamb mortality with yearling mothers

Thus:-

- | | |
|--------------------------|-----------------------------|
| ● Spencer et al.(1942) | 32% (L.size = 1.06) |
| ● Gordon (1967) | 24% (L.size = 1.09) |
| ● Quirke (1975) | 31% (L.size = 1.61) |
| ● Smith (1977) | 54% (L.size <1.5) |
| ● Thomas (2000) | 32% (L. size = 1.52) |
| ● Fogarty et al. (2007) | 31% (L.size = 1.31) |
| ● Kenyon et al. (2006) | 25% (L.size = 1.12) |
| ● Annett & Carson (2006) | 36% (L. size = 1.38) |

While value depends on litter size it is evident that loss rates are very high even for singles

Management of yearling mothers post lambing

- **Manage yearling ewes with twins separately at pasture – on high quality herbage**
- **Need careful attention to parasite challenge and control due to limited immune status & later lambing**
- **Wean earlier than adult ewe flock to allow adequate time to recover prior to 2-tooth joining**

Icelandic study: effect of ewe lamb rearing system (Thorsteinsson & Thorgeirsson 1989)

- **High and Low nutrition during first winter**
 - difference of 9.8 kg at start of summer grazing
 - difference of 4.3 kg at 16 months
 - difference absent at 2nd joining (32 months)
- **H ewes were more prolific (over 7 seasons):—**
 - Litter size 1.69 v 1.59
 - But no evident effect on maternal performance, as judged by progeny weight at weaning,
or
 - Longevity up to 7th joining

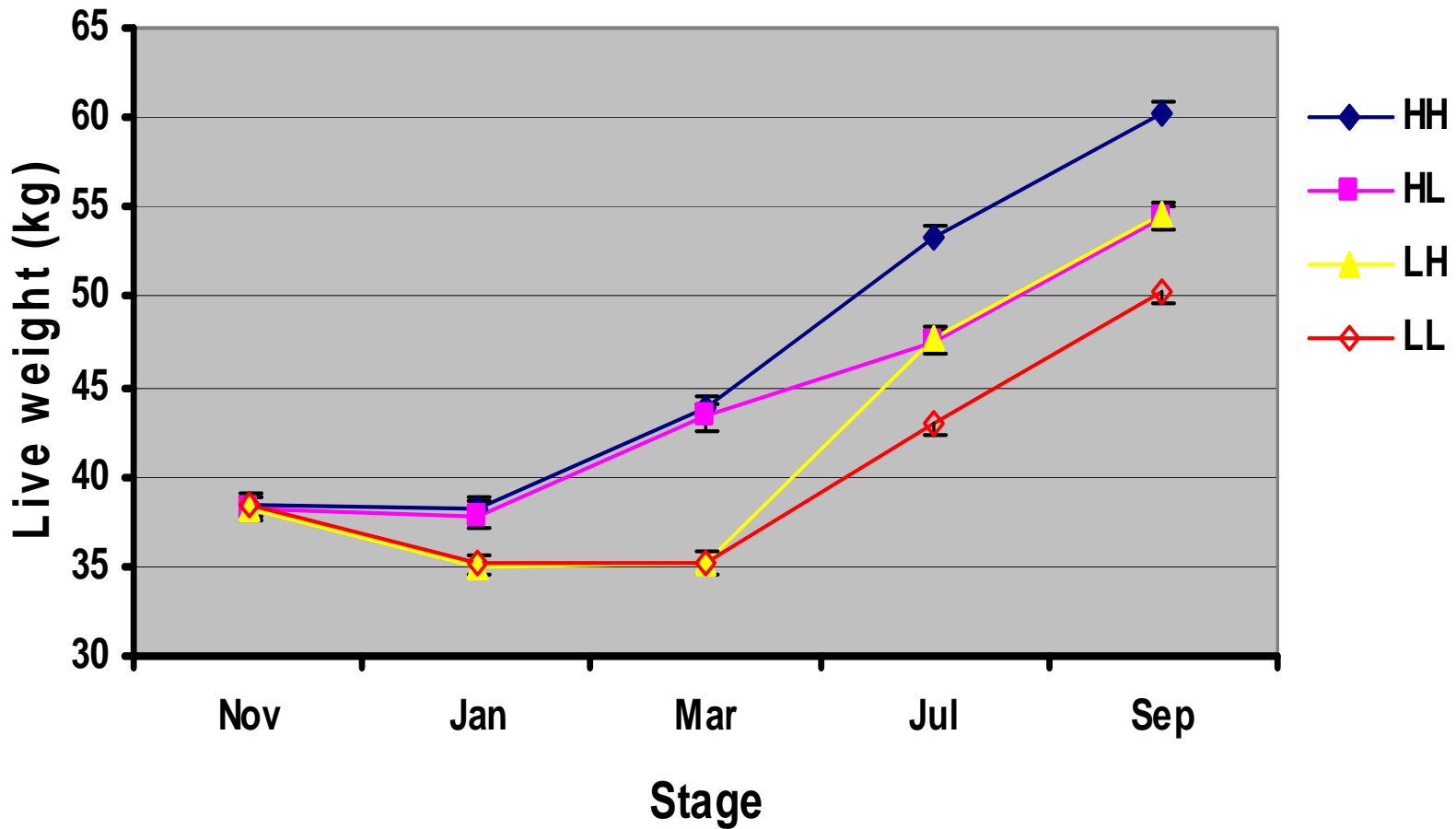
Management system for replacement ewe lambs and lifetime performance

- **Three cohorts involved – born 2006, 2007 & 2008; 290 individuals in total**
- **Joined for first time as 2-tooth ewes in syndicate mating with terminal-breed sires**
- **Performance being measured over 5 seasons;**
 - standard reproductive performance traits
 - ovulation rate at 2- and 4-tooth stages;
 - body size
- **Study on-going**

Management system for replacement ewe lambs and lifetime performance

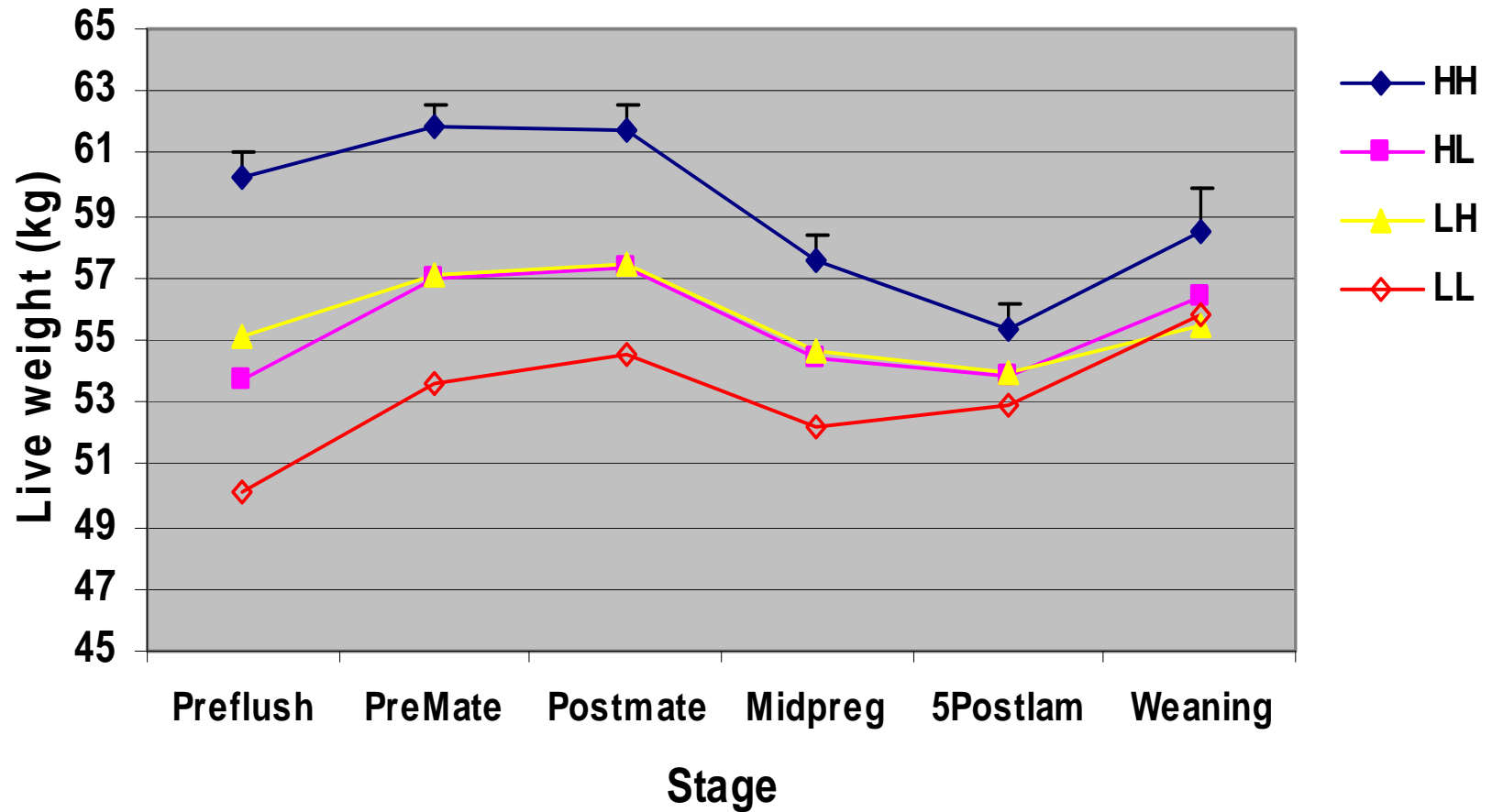
- **Factorial arrangement of feed levels during autumn/winter (Nov to Mar) and spring/summer (Apr to Sep)**
- **Two levels herbage dry matter allowance during autumn/winter grazing**
 - 0.75 kg (L)
 - 1.75 kg (H)
- **Two sward heights during spring/summer grazing**
 - Low = maintained at 4 cm
 - High = maintained at 6 cm
- **Thus, treatments HH, HL, LH, LL**

Live weight trajectory for treatment groups



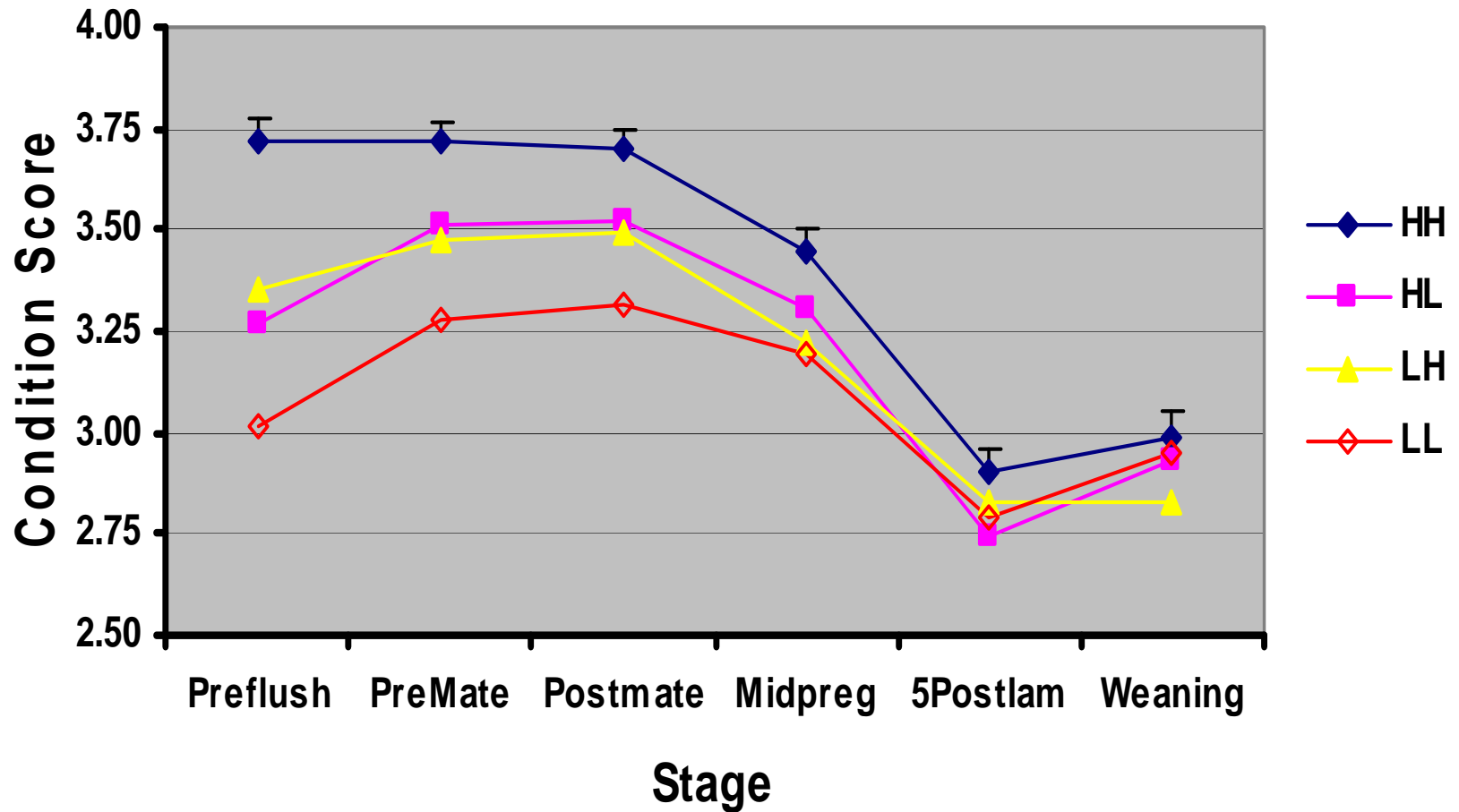
Study by TWJ Keady at Teagasc,
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Live weight:- 2-tooth ewes



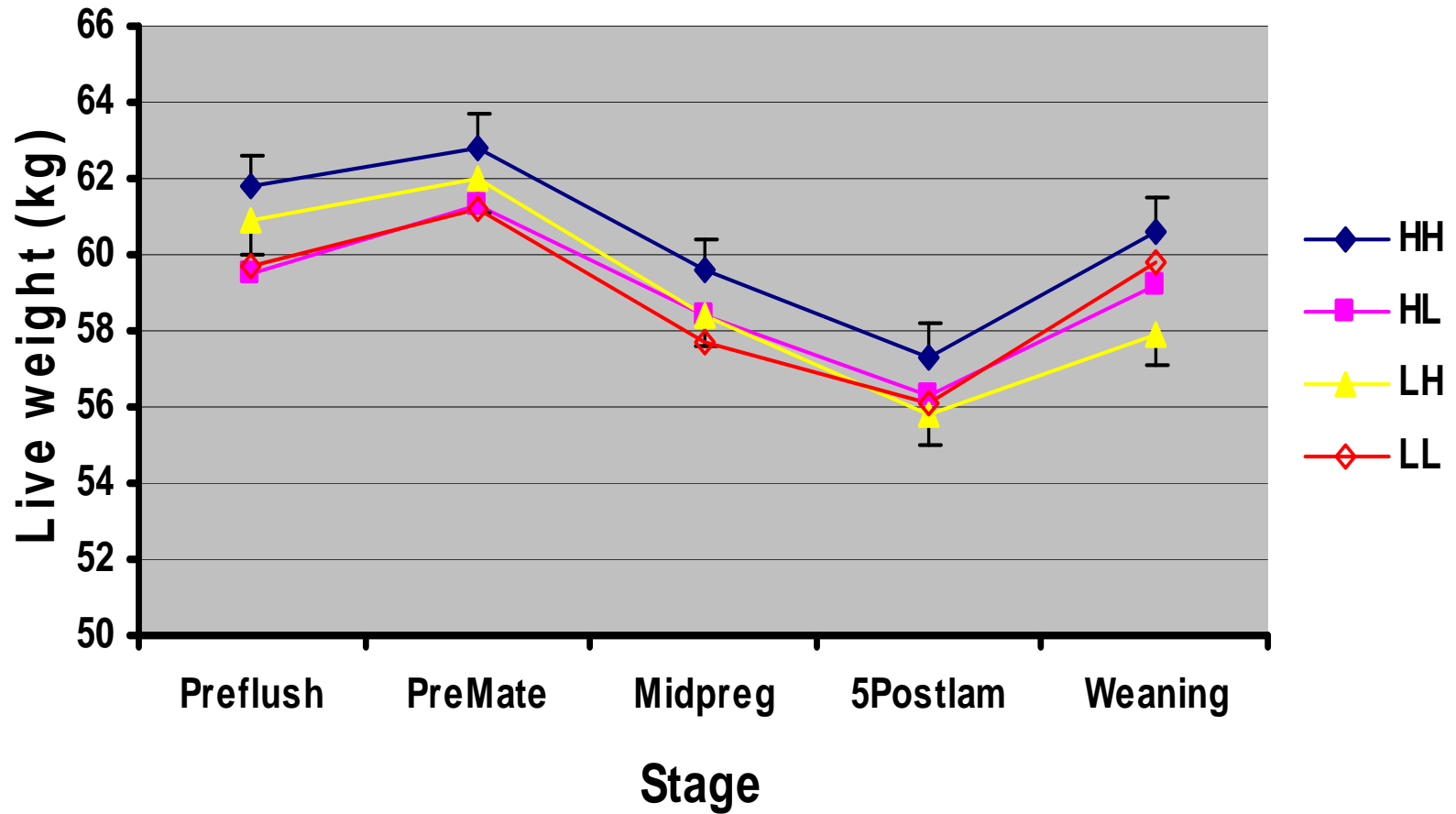
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Body condition score:- 2-tooth ewes



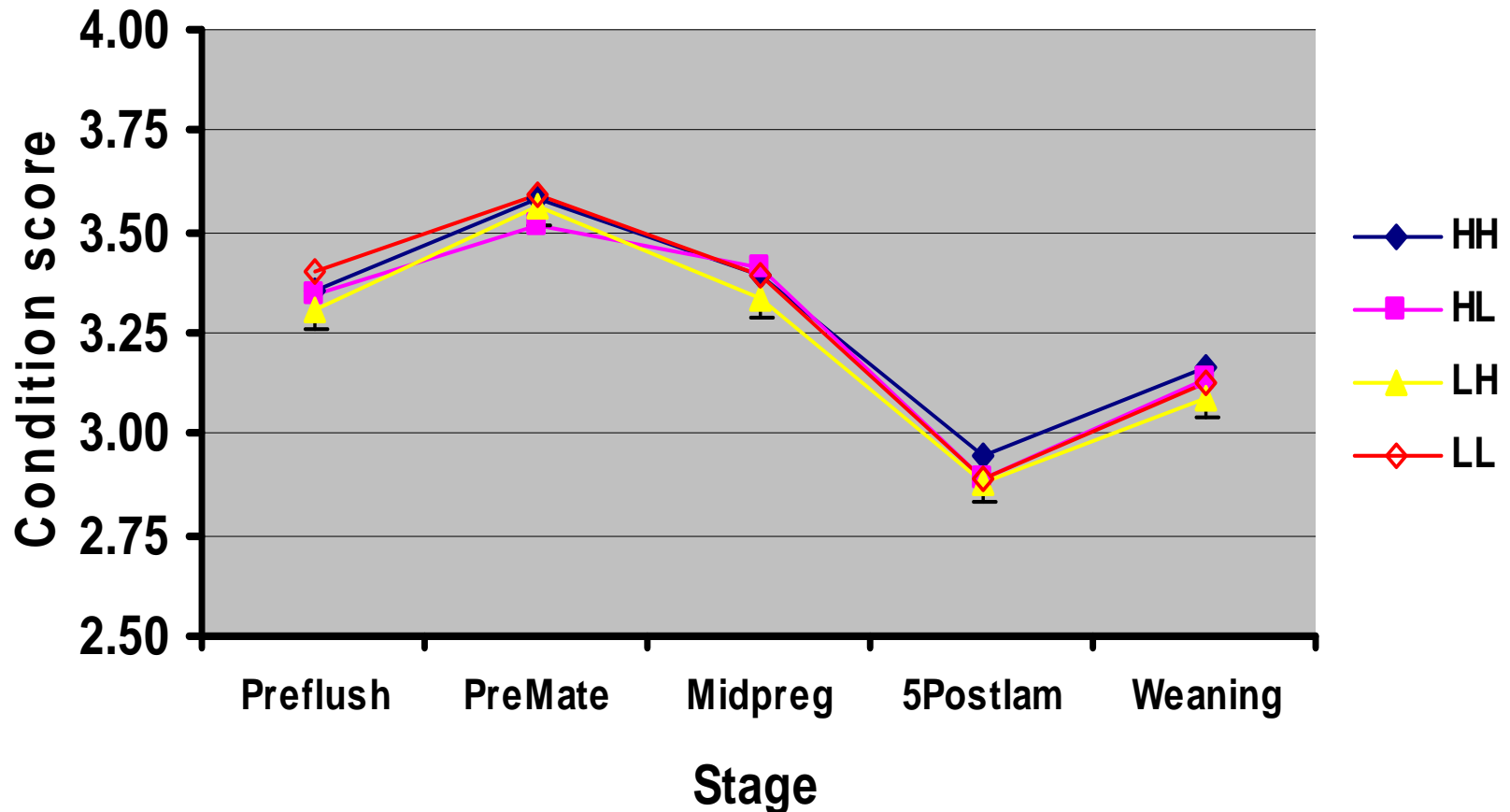
Study by TWJ Keady at Teagasc,
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Live weight:- 4-tooth ewes



Study by TWJ Keady at Teagasc,
Athenry

Body condition score:- 4-tooth ewes



Study by TWJ Keady at Teagasc,
Athenry

Reproductive performance (to 2010)

Treatment	Ovulation rate	Fertility	Litter size
HH	2.23	0.97	1.92
HL	2.23	0.96	1.95
LH	2.19	0.93	1.96
LL	2.21	0.94	2.00
s.e.	0.07	-	0.09

No significant differences

Progeny of 2-year old ewes

Treatment	Birth wt. (kg)	Growth to 5 weeks (g/day)	Weaning wt. (kg)
HH	4.3	256	28.1
HL	4.2	271	29.0
LH	4.1	263	28.4
LL	4.1	252	27.7
s.e.	0.08	6.3	0.45
Interaction	n.s.	$P < 0.02$	$P < 0.05$

Study by TWJ Keady at Teagasc,
Athenry

Effect of lambing at 1 year on performance as 2-tooth (Kenyon et al. 2008)

	Lambled at 1 year		P value
	Yes	No	
Condition score at joining	2.8	3.3	<0.05
Live weight (kg) at joining	44.8	51.6	<0.05
Incidence of single births	48%	38%	<0.05
Progeny live weight at 48 days (kg)	15.8	15.4	0.06

Effect of lambing at 1 year on lifetime productivity

- **Spencer et al. (1942):** +11% for total lambs weaned
+ 7% for total weight weaned
- **Vavra et al (1978):** +20% for total lambs weaned
+ 9% for total weight weaned
- **Fogarty et al. (2007):** + 15% for total lambs weaned
+? for total weight weaned
- **Ponzoni et al. (1979):** +10% for total lambs weaned
+ 6% for weight weaned

Overall summary:

6% to 20% extra output – but less for weight than number

Summary & Conclusions

- Avoid extremes in growth trajectory of ewe lambs to mid pregnancy & for dry replacements
- Target live weight should be attained by start of joining as high feed level during pregnancy can have profound effects on nutrient partitioning >> low birth weight lambs
- Should attain ~0.9 lambs weaned per ewe lamb joined
- No effect of lambing at 1 year on subsequent productivity or longevity – opportunity to increase lifetime output by ~15%
- Overall benefit will depend on production context
- Replacement rearing regime can affect performance of 2-year old ewes
- Definite need for more information on perinatal management of yearling mothers towards minimizing lamb mortality; including interactions with pregnancy nutrition



References

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