

## **Finishing Store Lambs During Winter: Which Diet to Offer?**

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Approximately 20% of the annual lamb kill occurs during January, February and March, thus ensuring a continuous supply of lamb to the market. A large proportion of these lambs are finished on concentrate diets. However, the price of concentrates has increased dramatically in recent times. Use of ensiled forages may provide more cost effective methods of finishing lambs. The benefits of high feed-value grass silage in finishing beef cattle, producing liquid milk and feeding to pregnant ewes are well documented. However, there is little information on the benefits of high feed-value grass silage in the diet of finishing lambs.

Maize silage can be sown either in the open or under the complete plastic mulch system. In recent years due to developments in plant breeding and the complete-cover-plastic-mulch system, the yield potential and, consequently, the production, of maize silage has increased dramatically. The benefits of including maize silage in the forage component of the diet of finishing beef cattle and lactating dairy cows are well documented (Keady 2005, Keady et al 2007, 2008). Furthermore, recent studies at Athenry have shown that maize silage can replace grass silage in the diet of pregnant ewes (Keady and Hanrahan 2008 and 2009). A sizable quantity of maize silage is traded from arable to livestock farms. However, there is little information on the benefits of high feed-value maize silage in the diet of finishing lambs. The aim of this paper is to present data from a recent study undertaken at Athenry to evaluate the effects of concentrate feed level, forage type and forage feed-value on the performance of finishing lambs.

### **Athenry Study**

A study was undertaken to evaluate the effects of maturity of maize at harvest, grass silage feed-value and concentrate feed level on lamb performance during finishing. Two maize silages differing in stage of maturity at harvest, and consequently dry matter and concentrations of starch, were produced from the variety Benicia, either sown in the open or under complete-cover-plastic-mulch system. Use of the complete-cover-plastic-mulch system increased forage yield (by 42%) and the concentrations of dry matter and starch at harvest.

High and medium feed-value grass silages were harvested and ensiled precision chopped. Each of the four silages was offered *ad lib* supplemented with concentrate (0.2, 0.5 or 0.8 kg/lamb daily).

The concentrate offered to lambs receiving 0.2 kg daily was mineralised soyabean meal. The concentrate offered to lambs receiving 0.5 kg/day 0.8 kg/d and *ad libitum* contained 16% crude protein and consisted of barley, citrus pulp, soyabean meal and maize meal. The lambs offered *ad libitum* concentrate were supplemented with 0.5 kg/day of the high feed-value grass silage. All lambs offered the grass silage diets were supplemented with 20 g minerals and vitamins daily whilst those offered maize silage diets received 30 g minerals and vitamins daily. The 13 diets were offered to store lambs (which had been purchased at local marts), which were housed unshorn in slatted pens, for 76 days. All lambs were treated for internal and external parasites. The dry matter digestibility (DMD) of the low and high feed-value grass silages were 70% and 75%, respectively. The starch concentrations of the low and high DM maize silages were 4 and 28%, respectively.

### **Grass Silage Feed-Value and Lamb Performance**

Digestibility is the most important factor affecting animal performance from grass silage. Previous studies have clearly shown that each 5 unit increase in digestibility increased lamb birth weight, and reduce lamb age at slaughter by 0.5 kg and 2 weeks, respectively. Furthermore each 5 unit increase in digestibility increased milk yield in dairy cows and carcass gain of beef cattle by 1.85 kg/day and 21 kg over a 150 day finishing period, respectively. The average DMD of silages produced on Irish farms is 70% DMD which is similar to the DMD of the medium feed-value grass silage in the current study.



**High levels of lamb performance were achieved from high feed-value grass silage supplemented with only 0.2 kg concentrates / lamb / day.**

The effects of silage feed-value on lamb performance during finishing is presented in Figure 1 and Table 1. The high feed-value silage resulted in higher levels of lamb performance regardless of

concentrate feed level relative to the low feed-value silage . High levels of lamb growth rate (150 g liveweight gain/day) were achieved from the high feed-value silage supplemented with only 0.2 kg concentrate. The response to increasing concentrate feed level was higher for the low feed-value grass silage due to a lower forage substitution rate. Each 0.5 kg increase in concentrate feed level increased total dry matter intake by 0.13 and 0.23 kg and reduced silage intake by 0.31 and 0.21 for the high and low feed-value silages, respectively. Consequently, increasing concentrate supplementation with the high feed-value silage resulted in concentrate displacing a larger proportion of silage in the diet.

High feed-value silage reduces the quantity of concentrate required to achieve a given level of performance. The results of the study show that the high feed-value silage supplemented with 0.2 kg concentrate daily produced the same level of daily carcass gain as the low feed-value silage supplemented with 0.7 kg concentrate daily. Consequently, the high feed-value silage reduced concentrate requirement by 0.5 kg/day to maintain the same level of performance as achieved from the medium feed-value silage.

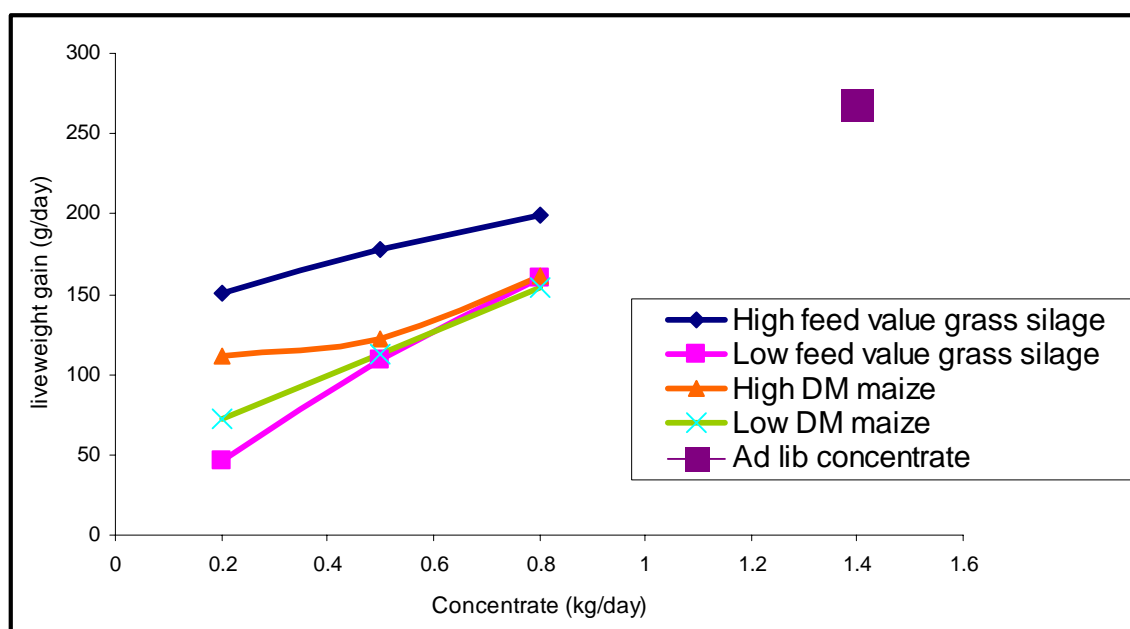
**Table 1. Effect of silage type and concentrate level on lamb performance and margin over feed (MOF)**

Treatment		Carcass gain (g/d)	MOF (c/day) when carcass price is		Sensitivity analysis (c/day)	
Silage	Concentrate (kg/d)		€4.00/kg	€4.50/kg	± €30/t concentrate	± 30c/kg carcass
75 DMD	0.2	74	14	19	2.2	0.6
	0.5	85	13	18	2.6	1.5
	0.8	114	19	26	3.4	2.4
70 DMD	0.2	14	-5	-3	0.4	0.6
	0.5	62	8	12	1.9	1.5
	0.8	86	11	16	2.6	2.4
High DM maize	0.2	54	8	13	1.6	0.6
	0.5	67	9	14	2.0	1.5
	0.8	90	12	17	2.7	2.4
Low DM maize	0.2	30	-2	1	0.9	0.6
	0.5	62	5	9	1.9	1.5
	0.8	86	9	14	2.6	2.4
Concentrate	<i>Ad-lib</i>	157	25	33	4.7	4.3

(Keady and Hanrahan 2011)

## Effects of Maize Silage on Lamb Performance

Previous studies have shown that the optimum stage of maturity to harvest maize silage which is to be offered to pregnant ewes, lactating dairy cows or finishing beef cattle is at approximately 30% dry matter and 30% starch. The effects of maize silage, when offered as the sole forage, on lamb performance is presented in Figure 1 and Table 1. Increasing maturity of the maize silage at harvest increased lamb performance. Whilst there were no effects of maturity of maize at harvest on silage intake, the higher levels of lamb performance from the high dry matter maize silage relative to the low dry matter maize silage was attributed to the higher energy concentration of the high dry matter maize silage (reflecting the higher starch concentration). High dry matter maize silage increased lamb performance relative to medium feed-value grass silage. Low dry matter maize silage resulted in the same level of lamb performance as the medium feed-value grass silage.



(Keady and Hanrahan 2011)

**Figure 1. Effect of silage type and concentrate level on lamb liveweight gain (g/day)**

### ***Ad lib* Concentrate Feeding**

One of the treatments evaluated in the current study was concentrate offered *ad libitum*. The level of concentrate offered was increased daily and *ad libitum* intake was achieved within 10 days post housing. In the current study, the lambs offered the *ad libitum* concentrate diets received 0.5 kg fresh weight of the high feed-value silage as a fibre source. Offering the concentrate *ad libitum* resulted in high levels of lamb performance (267 g liveweight gain daily) which is similar to the target for pre-weaning gain of twin and triplet reared lambs on grass-only systems. In the current

study the lambs on *ad libitum* concentrate consumed 1.4 kg concentrate daily. The food conversion ratio was 9.1 kg dry matter intake per 1 kg of carcass gain.



**Using current concentrate and lamb carcass prices, *ad libitum* concentrate feeding resulted in the greatest daily margin over feed.**

### **Effect of Diet on Margin over Feed**

The effects of diet type on margin over feed (MOF) is presented in Table 1. In the financial analysis a land charge was included for the production of the grass and maize silages. It is assumed that concentrate was purchased at €250/t. The margin over feed is presented as cent per lamb per day. The data presented in Table 1 clearly illustrate that medium feed-value grass silage (70% DMD) and low dry matter maize silage do not have a role in finishing store lambs. Offering concentrate *ad lib* resulted in the higher margin over feed at a carcass price of €4.50/kg. If lamb carcass price was as low as €4/kg, as occurred in previous years during the December to March period, *ad lib* concentrate feeding would result in the higher margin over feed even if concentrate cost €250 per tonne. This is due to the high level of performance (liveweight gain of 267 g/d) and the better feed conversion efficiency.

The effects of changing carcass price by 30c/kg or concentrate price by €30/tonne on daily margin over feed is also presented in Table 1. As concentrate price increases the advantage of offering concentrate *ad libitum* diminishes. At a lamb carcass price of €4.50/kg concentrate price would need to reach €370/t before use of any of the silages resulted in similar daily margin over feed. However, in previous years the price received for lamb carcass was lower. Consequently, at a concentrate cost of €250/t lamb carcass price would need to be less than €3/kg before offering concentrate *ad libitum* would be uneconomical relative to the use of ensiled forages.

## Summary

1. Whilst finishers have little influence on lamb carcass price they can control the performance of the lambs during the finishing period.
2. Using current concentrate and lamb carcass prices, *ad libitum* concentrate feeding resulted in the greatest daily margin over feed.
3. High levels of lamb performance were achieved from high feed-value grass silage supplemented with only 0.2 kg concentrate..
4. Relative to the medium feed-value grass silage, to maintain lamb daily carcass gain, the level of concentrate offered with the high feed-value grass, high dry matter maize and low dry matter maize silages could be reduced by 0.5, 0.3 and 0.1 kg daily, respectively.
5. Regardless of silage type, increasing daily concentrate feed level from 0.5 to 0.8 kg/lamb during the 76 day feeding period increased carcass weight by 1.9 kg, carcass value by €8.55, concentrate intake by 23 kg and concentrate cost by €5.75, respectively.
6. It is important to draft lambs regularly to avoid penalties for overweight carcasses.

## References

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