Animal & Grassland Research & Innovation Programme

Johnstown Castle

Early Maturing Dairy Calf to Beef Trial

Johnstown Castle, Co. Wexford

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teagasc

Agriculture and Food Development Authority

Irish Hereford Breed Society

abp Ireland

Part of ABP Food Group

Irish Hereford Prime

Certified Irish Angus Beef

Irish Angus Cattle Society

Beef Production from the Dairy Herd

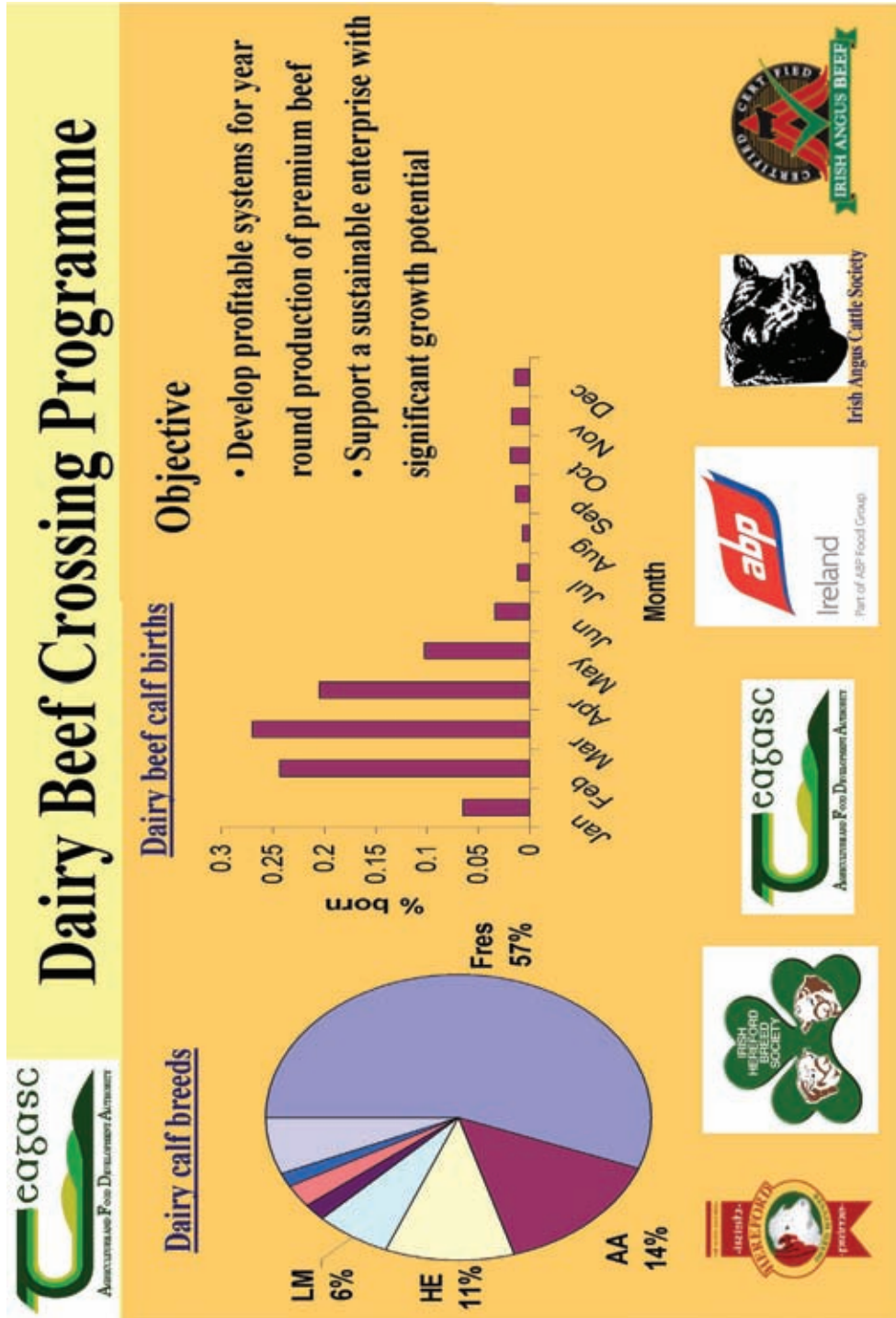
Padraig French, Animal and Grassland Research and Innovation Centre, Teagasc, Moorepark. Fermoy, Co. Cork.

Historically, from the introduction of milk quotas in 1984 until 2007 approximately 55% of all dairy cows were bred to beef bulls with the remainder bred to dairy bulls to breed replacements for a dairy herd that was declining at 2% per annum. In the current quota phase out period approximately 60% of dairy cows are bred to dairy bulls with the remainder (400,000 in 2008) to beef bulls of Angus (14%) Hereford (11%), Limousin (6%) and other continental breeds (9%). This increased dairy bull usage since 2008, if it continues, will lead to an increase in the national dairy cow population of 4-5% per annum from 2011 to achieve a national dairy herd of 1.65 million by 2020. As well as increased dairy output, this will also lead to a substantial increase in beef cross calves from the dairy herd. Most of the predominant beef breeds used on the dairy herd achieve a high level of carcass fatness at a young age and are therefore suitable for systems of production which are grass based and produce a saleable carcass at relatively low slaughter weight. These traits facilitate systems of production which are biologically, environmentally and economically efficient.

Previous research at Grange Research Centre evaluated the merits of early maturing crossbred animals from the dairy herd (both heifers and steers). These systems focused on low input pasture based production systems. A 19-month production system was identified for early maturing spring born crossbred heifers. Animals were slaughtered off pasture at the end of the second grazing season. Lifetime concentrate supplementation was 250 kg per head. Live weight at slaughter was 460 kg with a carcass weight of 235 kg. The early maturing spring born steers were slaughtered at 22 months of age. These animals were housed at the end of the second grazing season and given an 84 day finishing period. Live weight at slaughter was 570 kg with a carcass weight of 295 kg. Concentrate input during the finishing period was 420 kg per head (5 kg of concentrates plus silage ad-libitum) with a total lifetime concentrate input of 670 kg per head.

A number of products (Hereford Prime and Certified Angus) are currently on the market which capitalise on the eating quality traits of animals from these sire breeds within pre-defined carcass weight, age and fatness specification. Since early 2011 Teagasc have developed a joint research programme with ABP Food Group, Certified Irish Angus and Irish Hereford Prime, Irish Angus Cattle Society Ltd and the Irish Hereford Breed Society to optimise the production of this enterprise by developing technology for each of the key stakeholders involved, including the beef bull breeder, the dairy farmer, the beef farmer and the meat processor.

The aims of this experiment are to establish low input systems of production for early maturing heifers and steers that are profitable to producers and result in a high value product that is continuously available to the marketplace and to support a sustainable enterprise with significant growth potential.



Early Maturing Trial in Johnstown Castle

Robert Prendiville[1], Brendan Swan[2], Pearse Kelly[3]

[1]Animal and Grassland Research and Innovation Centre, Teagasc, Grange,
[2] Department of Crops Environment and Land-Use, Environment Research Centre, Teagasc, Johnstown Castle and [3]Teagasc, Kildalton College, Piltown.

In spring 2011, 128 early maturing dairy cross calves were assembled at the Johnstown Castle research farm. This was the first year of a 3 year study. Sixty-four February born calves were purchased in early March, 32 males (16 Angus and 16 Hereford) and 32 females (16 Angus and 16 Hereford). An additional 64 April born calves, identical in breakdown to that purchased in March, were purchased in late April/early May. Calves were 2 to 3 weeks of age at the time of purchase and were reared artificially until weaning. Finishing systems were defined for both heifers and steers. The aim of this experiment was to establish low input systems of production for early maturing heifers and steers that are profitable to producers and result in a high value product that is continuously available to the marketplace.

Heifer production systems

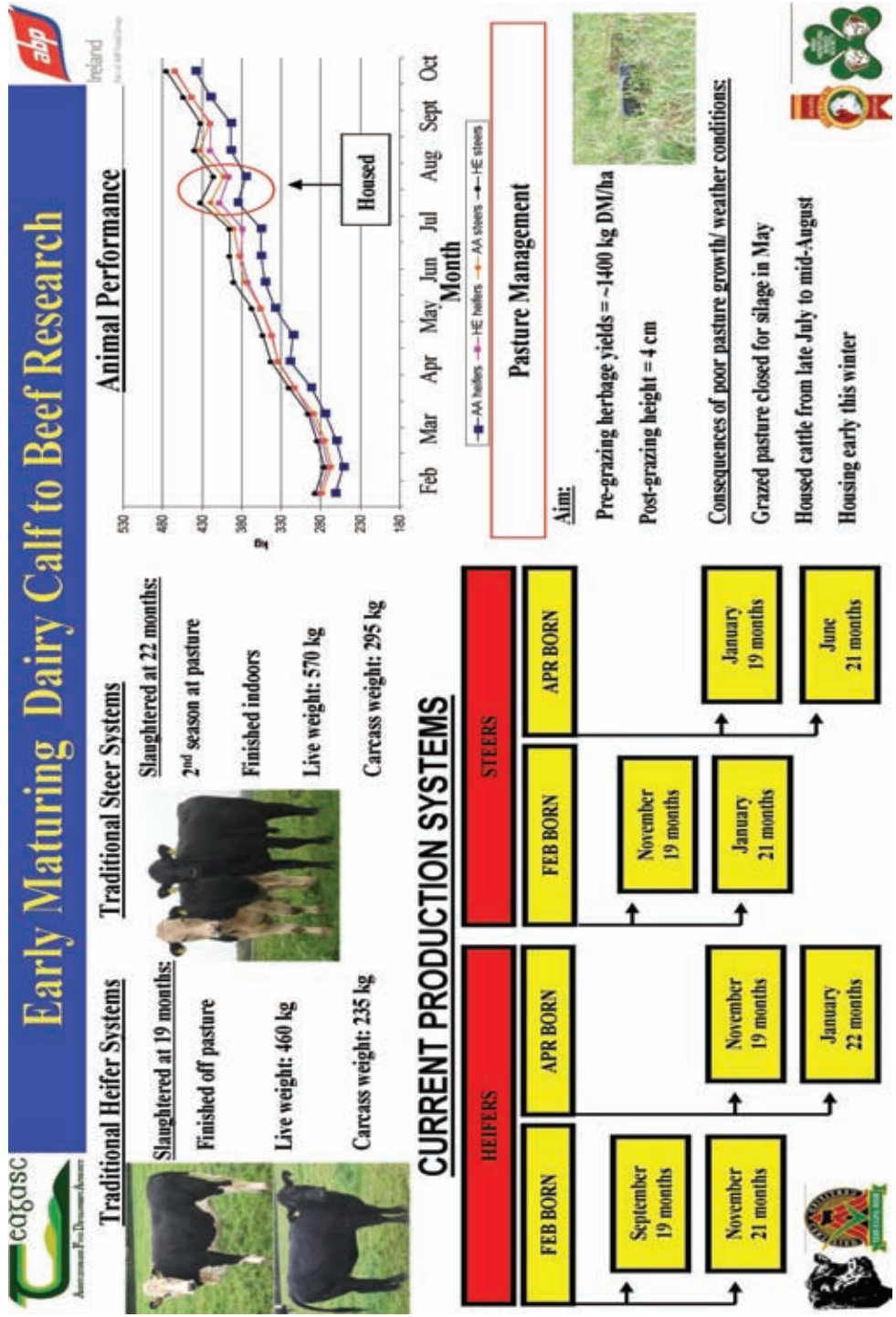
Each finishing system contains 16 animals; 8 Angus and 8 Herefords. The first 16 February born heifers will be slaughtered in September at 19 months of age. The remaining heifers will be slaughtered in November at 21 months of age. These animals will be slaughtered off pasture and animals will receive 2.5 kg of concentrates per day for the final 60 days. The April born animals will also have two ages at slaughter. The first group will be slaughtered in November at 19 months following supplementation with concentrates for the final 60 days at pasture. The remaining animals will be housed and finished on silage ad-libitum with 4 kg of concentrates per day. These animals will be slaughtered in January at 21 months of age.

Steer production systems

The first group of February born steers will be slaughtered in November at 21 months of age. Animals will be finished off pasture with 2.5 kg of concentrate supplementation. The remainder of the February born steers will be housed and finished indoors on silage ad-libitum with 4 kg of concentrate supplementation per day. These animals will be slaughtered in January. Late born steers will also have two slaughter dates. The first group will be housed in November after the second season at pasture and finished at 21 months of age on silage ad-libitum plus 4 kg of concentrates. These animals will be slaughtered in January. The final group will be housed and stored over the second winter on silage ad-libitum plus 2 kg of concentrates daily. These animals will be turned out to pasture for a third season and will be slaughtered in June.

Conclusion

The finishing systems are presented from the first year of the research study being carried out at Johnstown Castle; the aim of which is to establish sustainable systems of production for early maturing heifers and steers that are profitable to producers and result in a high value product that is continuously available to the marketplace. Initial results from the study will start to come available in late 2012.



Financial returns from early maturing dairy calf to beef systems

Paul Crosson and Austen Ashfield
Animal and Grassland Research and Innovation Centre, Teagasc, Grange, Dunsany, Co. Meath

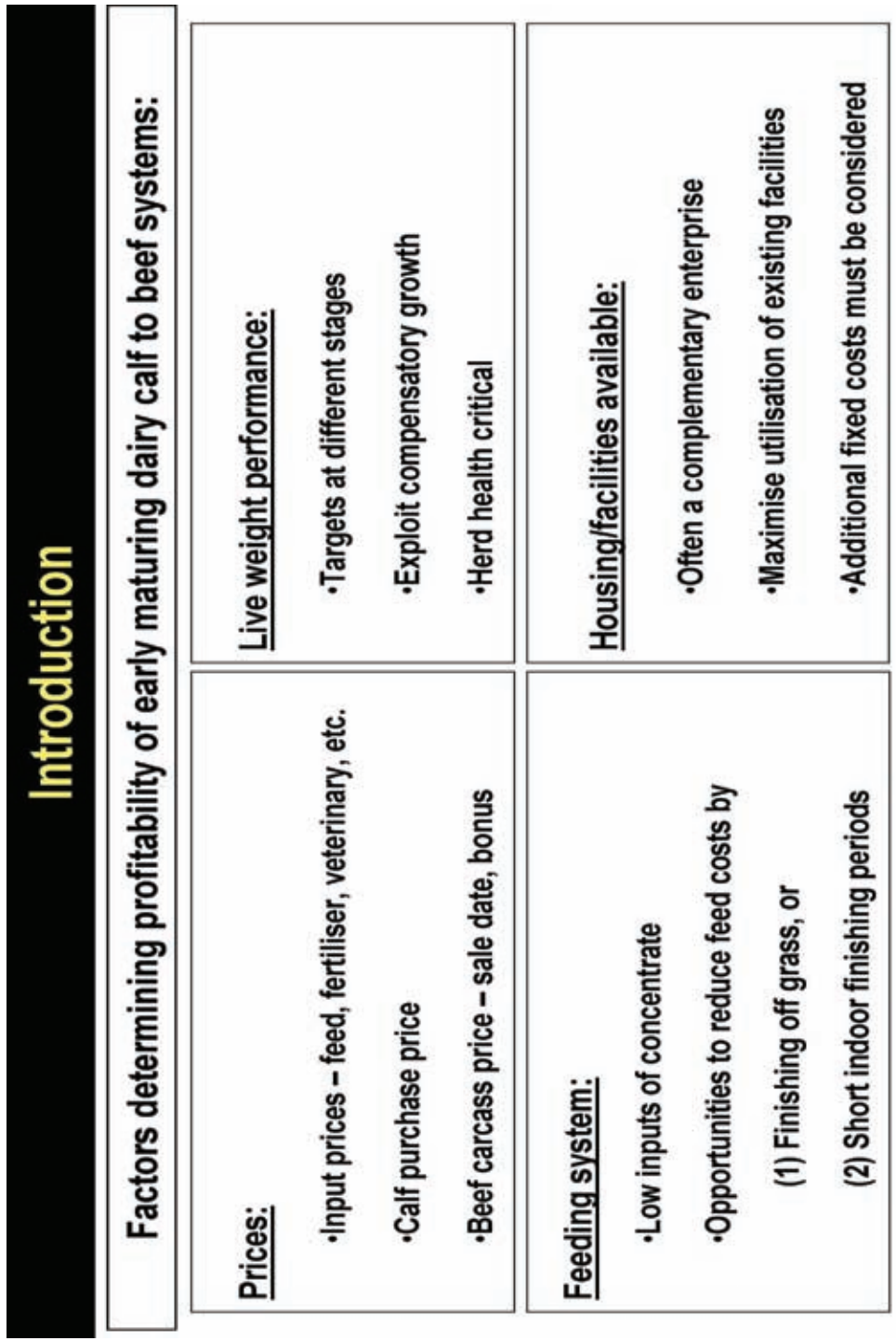
The economics of three dairy calf to beef systems using spring born, early maturing crossbred progeny were evaluated. The description of these systems is given below with approximate live weight targets. The stocking rate of all systems was 170 kg organic nitrogen per hectare. In the analysis, land and labour costs were not included.

Heifer system finishing at 19 months of age: In this system, heifer progeny are purchased as calves at 14 days of age, reared artificially and turned out to pasture for their first grazing season. Calves are supplemented with 1 kg concentrate ration at pasture. Good quality grass silage (>72% DMD) is fed ad libitum over the winter period in addition to 1 kg of concentrate to achieve a target live weight gain of 0.6 kg/d. This modest level of live weight gain during the first winter facilitates compensatory growth at grass during the second grazing season. Heifers are finished off grass at the end of the second grazing season with no supplementation.

Steer system finishing at 21 months of age: The operation of this system for the first grazing season and first winter is the same as the 19 month heifer system although higher birth weights and a slightly higher live weight performance results in a live weight at turnout for the second grazing season of 295 kg. The management during the second grazing season also mimics the heifer system with the exception that steers are finished at 21 months of age in November. For the final 60 days at grass, concentrate supplementation is provided at a rate of 3 kg/head.

Steer system finishing at 23 months of age: In the case of steers finished at 21 months of age, an early born animal and the achievement of high levels of animal performance at all stages in the life cycle is necessary in order to reach slaughter weight and fat cover at the end of the second grazing season. For later born calves or if target live weight gains are not achieved during the life time of the animal, it is necessary to house the steers for an indoor winter finishing period. For this system, steers are housed at the end of the second grazing season and receive a short indoor finishing period (approximately 60 days), during which good quality grass silage (>72% DMD) is fed ad libitum and supplemented with 4 kg of concentrate ration.

An important aspect of these alternative systems is the impact of sale date on beef price. The beef carcass prices specified opposite assumed an average annual price of €4.00/kg carcass and used long term price trends to take into account the effect of seasonality of sale on beef price. Therefore, beef price was highest for the steers sold at 23 months of age and lowest for steers sold at 21 months of age. In many cases, dairy calf to beef systems are complementary enterprises to a main suckler beef, dairy or sheep system on the farm and aim to increase output and the utilisation of existing facilities on the farm. In such instances, the financial measure of interest is the margin over direct costs (gross margin). In this analysis, the highest margin over direct costs was for the 23 month steer system. However, where additional facilities are necessary to maintain the dairy calf to beef enterprise, these additional fixed costs must also be taken into account. It is apparent that when full costs are considered, including fixed costs, all of the systems return similar margins of approximately €150 per hectare. The systems are particularly sensitive to beef carcass price and, to a lesser extent, calf price.



Physical Performance Details

	Heifer System	Steer System	
Age at slaughter	19 months	21 months	23 months
Live weight (kg)			
First season to grass (May)	80	85	85
First season housing (November)	230	235	235
Second season to grass (March)	285	295	295
Second season housing (November)	-	-	510
Slaughter weight	460	530	560
Kill out %	51%	52%	53%
Carcass weight (kg)	235	275	295
Concentrate fed (kg/head)	359	594	654
Live weight gain from grass	71%	73%	65%
Animal units per ha	3.0	2.5	2.2

Financial Performance Details

	Heifer System		Steer System			
Age at slaughter	19 months		21 months		23 months	
Purchase price (€/head)	250		300		300	
Beef carcass price (€/kg)	3.93		3.81		4.05	
Profitability (€)	**Per head**	**Per ha**	**Per head**	**Per ha**	**Per head**	**Per ha**
Livestock sales	921	2,735	1,046	2,664	1,191	2,656
Less						
Purchases	264	783	317	806	317	706
Concentrate feed	109	323	178	452	195	435
Other feed	256	761	240	611	261	581
Other direct costs	79	234	85	217	87	195
Margin over direct costs	213	**634**	227	**578**	332	**739**
Fixed costs	162	481	162	413	267	595
Margin over total costs	51	**153**	65	**165**	65	**144**
Sensitivity (impact on margin)						
Calf price (+/- €10/hd)	11	31	11	27	11	27
Concentrate price (+/- €10/t)	3	9	5	13	6	16
Beef price (+/- 10 c/kg)	23	70	27	70	29	64

Grass for Early Maturing Beef

Michael O'Donovan
Grassland Science Research Department Teagasc Moorepark, Fermoy, Co. Cork.

Summary

- Grazed grass is the cheapest feed on beef farms and offers the most potential to increase profitability
- Increasing grass utilisation, farm stocking rate and grazing days at grass are the main drivers of increased efficiency
- Target pre-grazing covers of between 1300-1600 kg DM/ha (pre height 8-10 cm) are desirable
- Mid-season grassland management must focus on offering high levels of green leaf which is the best avenue to increase total grass DM intake
- Building grass from early August and the use of grass budgeting will increase autumn grass utilisation
- Planning the closing strategy for the following spring ensures spring grass availability irrespective of over winter conditions

Spring grass utilisation

Early spring grazing has beneficial effects on animal and sward performance. Turning animals out to grass early can substantially reduce the overall concentrate and grass silage feed budget. During the early grazing season (February to April) a balance must be found between feeding animals adequately to sustain high animal performance and conditioning the sward for the late spring/summer grazing season. The key aspect of spring grazing management is to maintain a flexible approach. Generally, on beef farms this can be easily achieved as priority stock can be first for turnout in early spring. A number of recent experiments have taken place with differing livestock showing the benefits of spring grazing. At Grange in 2010, a study compared the effect of early turnout of spring calved suckler cows and their calves with a comparative group retained indoors. The study took place from 1 March to 29 March. A number of performance increases were observed from the early turnout group - milk yield per cow of the grazing cows increased by 18% while average daily gain of the calves increased by 22% during the study, and increased by 6% overall to weaning. The key opportunity afforded by earlier spring grazing was a saving of approximately €1.54/cow/day in feed costs and higher milk yield. The reduced requirement for slurry storage is not factored into this cost saving. Such efficiency, driven by a simple management practice, could be a key driver to increased production potential across beef farms.

Mid season grazing management

For each 1-unit increase in organic matter digestibility (OMD), grass dry matter intake (GDMI) is increased by 0.20 kg. Increasing herbage allowance results in small increases in GDMI. The aim must be to increase the quality of the grass allocated rather than the quantity offered; this is achieved by ensuring there is a high quantity of leaf in the sward. The key during the grazing season is to maintain grass quality while offering the target herbage allowance. The move to grazing lower grass covers of 1300-1700 kg DM/ha, while maintaining a rotation length of between 17-21 days has helped the pursuit of increased grass quality in the May to July period. During the mid-season, when a plant starts to head it produces a reproductive stem. This changes the balance of the plant from producing green leaf to producing high stem proportions. Green leaf content is directly related to grass digestibility. A 5.5% change in leaf content is equal to a 1-unit change in digestibility. Poorly managed swards can result in large reductions in green leaf content to just 50% leaf during the reproductive period. Well grazed swards (4.5 – 5 cm post-grazing sward height) will contain a high proportion of leaf in the mid grazing horizon (4 to 10 cm). This is the grazing horizon which has greatest influence on the GDMI achieved by the beef animal. Beef farmers must adopt a policy of offering swards with high leaf content throughout the season.

Main season grazing management can be difficult when stocking rates are low on farms and the easiest way of rectifying this is to increase the carrying capacity of the farm with extra stock. The tendency on all livestock farms is to graze high pre-grazing yields throughout the main grazing season and this is not the correct way forward to ensure high performance. In the last two years the adoption of the wedge based technology, whereby the target pre-grazing herbage mass is set at 1300-1700 kg DM/ha, has been adopted on dairy farms and should be used also in beef farm grazing management.

Autumn grazing management

As in spring, the focus of autumn grazing management is to increase days at grass and increase animal performance, but also to set the farm up on the final rotation to grow grass over the winter and provide grass the following spring. There are two key periods in autumn: (i) the period of autumn grass build up and (ii) managing the final rotation. Generally rotation length should be extended from 10 August. The focus of this period is to gradually build pre-grazing herbage mass, targeting covers of 2000-2300 kg DM/ha in mid-September. Pre-grazing covers >2500 kg DM/ha are difficult to utilise and should be harvested as surplus (round bales). Removing paddocks after the first week of September should be avoided if possible. Such paddocks have only one rotation left for grazing at that stage, removing these paddocks in September is too late as paddocks do not have enough time to regrow to make any meaningful contribution in the last rotation. Surplus paddocks should be removed in August. Such decisions can be easily made if the farm cover targets are achieved at the right time, many farmers fall into the trap of building cover too late and are pushed into harvesting excess grass in September.

Key points for autumn grazing management

- Build rotation length from 10 August, increasing rotation length from 28 days to 35 days in mid-September.
- Highest farm cover should be achieved in mid to late September.
- The first paddock required for spring grazing should be closed on 10 October, in slower grass growing regions closing may begin earlier. 60% of the herbage available for grazing next spring will be the grown once these paddocks have been closed.
- Each 1 day delay in closing from 10 October to 11 December reduces spring herbage mass by 15 kg DM/ha/day
- Have at least 60% of the farm closed by the end of the first week of November.
- All paddocks should be grazed to a post-grazing height of 4 cm during the last rotation to encourage winter tillering.

Managing Autumn Grass

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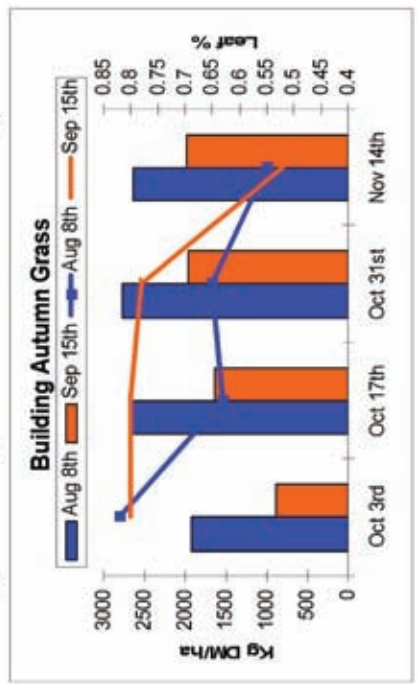
Autumn Grazing Management

- Build farm cover from early August -increase rotation length 1 day per week
- Highest Farm cover in late September
- Maintain high proportion of grass in the diet
- Long rotation length >35 days
- If supplementing -Concentrate/baled silage

Closing Management – 60:40 rule

- Close from 10th Oct (earlier in slow growing areas)
- 60:40 rule
  - 60% closed November 7th
  - Close remaining 40% before Dec 1st
- Each day delay in closing from Oct 10 reduce spring grass by 15kg DM/ha/day
- 60-70% of spring grass is grass carried over winter
- Graze out to 4cm, grazing tighter can reduce regrowth
- No re-grazing of closed paddocks
- Close better producing paddocks first if possible
- Need to target Spring grass - less days indoors



Rearing Healthy Stock

Ríona Sayers
Animal and Grassland Research and Innovation Centre, Teagasc, Moorepark, Fermoy, Co. Cork

Rearing healthy livestock, whether home born or purchased, depends on the implementation of a number of simple measures which, when used in combination, will minimise the risk of disease. Those measures are;

- Biosecurity
- Diagnostic Testing
- Vaccination

Biosecurity can simply be described as the management systems put in place to reduce the risk of introducing and spreading of infectious disease to and within a herd. It involves implementation of fundamental concepts such as quarantining of all newly purchased animals and maintaining stock-proof boundaries. Quarantine, if carried out correctly, involves the separation of groups of animals by a minimum of 3 meters, with no mixing of feed troughs, dung, or urine. Use of a quarantine system will allow restriction of an infectious diseases to a single group should an outbreak occur. Diagnostic testing involves the use of a variety of testing procedures, usually carried out on blood samples, to assess what diseases (if any) that livestock have been exposed to and what risk they may pose to the remainder of the herd. The most notable current example of the use of testing to minimise disease risk is the national BVD eradication scheme. This scheme has been operating on a voluntary basis in 2012 but will enter the compulsory phase on January 1st 2013. The scheme involves the use of ear-tags specifically designed to take a tissue sample which can be submitted to a laboratory for detection of BVD virus. Should a BVD virus positive animal be identified, the animal should be immediately isolated and re-tested at least three weeks following the initial test. If the re-test proves positive, this animal is a persistently infected (PI) animal and should be removed from the herd immediately. Further information on the BVD eradication scheme can be found at www.animalhealthireland.ie.

Vaccination is particularly important in the rearing of livestock. Youngstock are particularly susceptible to viral and bacterial pneumonias and a good vaccination programme will minimise the impact of an outbreak. Infectious agents involved in respiratory disease of youngstock include BVD (virus), IBR (virus), BRSV (virus), PI3 (virus), Mycoplasma (bacterium) and Pasteurella (bacterium). Effective vaccines are available for the viral respiratory agents and Pasteurellosis and should be included in a youngstock vaccination programme. Vaccines should always be administered correctly and in line with manufacturer's instructions.

Additional infectious agents that may impact on younstock include parasitic diseases, clostridial diseases, and Salmonellosis. Information relating to effective parasite control programmes can be found at www.animalhealthireland.ie. Vaccines are available for both clostridial diseases and salmonellosis should be implemented if herd history and diagnostic results indicate that they are required.

NOTES

Contact Details:

Teagasc Head Office
Head Office, Oak Park, Carlow
Tel: +353 (0) 59 9170200
Fax: +353 (0) 59 9182097
Email: info@teagasc.ie

www.teagasc.ie

Teagasc
Johnstown Castle, Co. Wexford
Tel: +353 (0) 53 9171200

Teagasc
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