

Blueprints for Spring born dairy calf-to-beef systems

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Summary

- Growth in the national dairy cow population will result in proportional increase in the number of dairy calves available for beef production.
- Pasture-based early-maturing breed dairy crossbred beef production systems can produce carcasses that have adequate weight and fat cover at slaughter.
- Dairy beef production systems are sensitive to calf purchase price, concentrate price and selling price.
- Systems that utilise high quantities of pasture are focused on high output per hectare are fundamental to the profitability of the production systems.

Introduction

Growth in the national dairy cow population will result in a proportional increased in the number of dairy calves available for beef production. Currently 57% of calves born are bred from dairy breed sires (Holstein-Friesian), 30% from early-maturing breed sires (Angus and Hereford) and the remainder from continental breed sires and other breeds (Figure 1). The profile of calves born to dairy breed sires has increased in recent years due to dairy herd expansion. However, as dairy cow numbers begin to plateau together with improvements in dairy cow reproductive efficiency, an increase in the proportion of dairy calves born from beef breeds is expected.

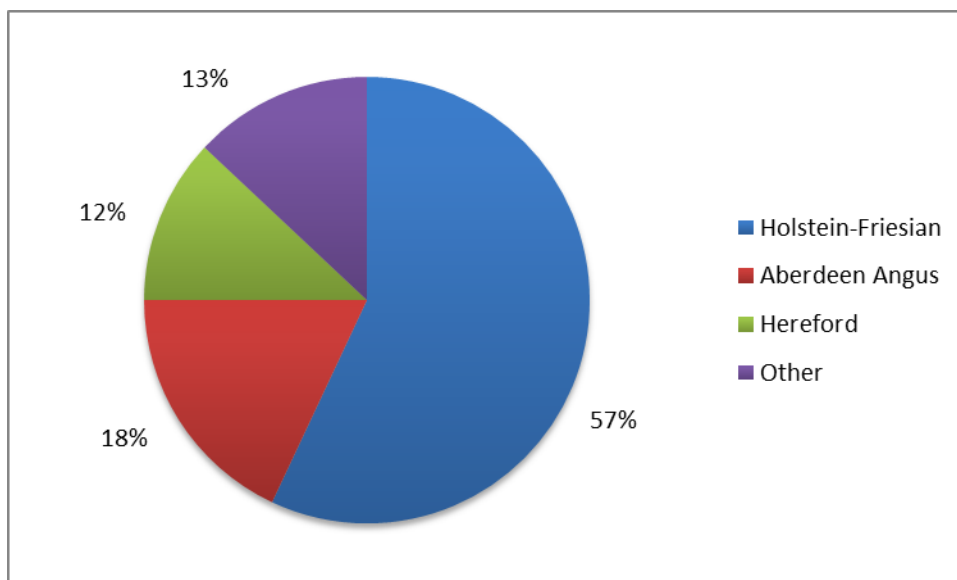


Figure 1. Sire breed profile of calves generated from the dairy herd (Animal identification and movement, 2016).

From a beef farmer's perspective a decision needs to be made on the type of calf that is purchased; Holstein-Friesian, Angus, Hereford or continental crossbred dairy bull or heifer calves? While the breed of calf does generate a lot of discussion, consideration should also be given to the production system that the calves are going to be managed within. A range of dairy calf-to-beef production systems are available that have significant implications on investment rate, stocking rate, housing facilities, labour, concentrate input, grass and silage requirements and, most importantly, profitability. The projected sale date should be established before calves are purchased. The actual sale date is ultimately dictated by animal performance and hence, live weight performance has implications for the carrying capacity of the farm.

In recent years, a range of production systems have been evaluated at Teagasc Grange and Johnstown Castle for Holstein-Friesian calves, and Angus and Hereford dairy crossbred calves. For the purpose of this paper the blueprints and profitability of these systems are presented.

Calf performance during their first grazing season

Optimising calf performance during their first season at pasture is essential to ensure that the targets set out in the blueprints below are achieved. The management of Holstein-Friesian calves and early-maturing breed dairy crossbred heifer and bull calves in this period are identical. Following the calf rearing stage, calves are supplemented with concentrates until mid-May (1 kg daily for 2 weeks), remain on a pasture-only diet until early September and are again supplemented with 1 kg of concentrates daily for 6 weeks until housing. Aside from male Holstein-Friesian calves allotted to the 15-month bull production system, the target average daily live weight gain (DLWG) of a calf during their first season at grass is 0.80 kg with a live weight target at housing of 230 kg. Male dairy calves assigned to the 15-month bull production systems require an DLWG of 0.90 kg during this period to ensure that the target carcass weight is achieved. For the other systems outlined below, animals are carried through their first winter on a diet comprised of grass silage *ad-libitum* supplemented with 1.5-2.0 kg of concentrates daily. Animal DLWG during the first winter is 0.7 kg. It is essential that attention to detail with regard to calf rearing, animal health and pasture management is observed to ensure that optimum animal performance is achieved.

Blueprints for spring born male dairy calf-to-beef production systems

Previously, the blueprint system for Holstein-Friesian cattle was for finishing at approximately two years of age at the end of the second winter in a steer production system. In this system steers were finished on a diet comprised of grass silage *ad-libitum* and 5-6 kg of concentrates daily. The target carcass weight was 320 kg. More recently alternative production systems and finishing strategies have been being explored by producers. With the shift from steer to bull beef production by some producers, particularly for Holstein-Friesian animals, it is essential that the market requirements are clearly understood from the outset. Age at slaughter, carcass weight, carcass conformation and fat scores are critical issues for beef production.

The Blueprints for spring born male Holstein-Friesian calves are:

- ***15-month bull system:*** Spring-born calves are housed in late October/early November, remain indoors, and are finished on a diet comprised of concentrates offered *ad libitum* with grass silage or straw as a source of roughage. Bulls are slaughtered in May/June. During the finishing period, concentrate input is approximately 1.8t dry matter (DM) (2.1t Fresh weight) and DLWG is 1.4 kg. The target carcass weight in this system is 270 kg with carcass conformation scores of O= and fat scores 2+. Meeting these targets at less than 16 months of age is necessary to satisfy UK market specifications. In research farm systems experiments carried out at Teagasc, Johnstown Castle, the target carcass weight for this system was difficult to achieve; additionally the system is highly vulnerable to increases in concentrate costs. It is critical that calves in this production system reach a housing live weight of 250 kg in November, at the end of the first grazing season, in order to successfully meet the market specifications.
- ***19-month bull system:*** Bulls are turned out to pasture in early March for the first part (100 days) of the second grazing season, housed in June and finished on concentrates offered *ad libitum* over a 100-day finishing period. Concentrate input is 1.2t DM during the finishing phase. Average DLWGs during the second season at pasture and finishing phase are 1.2 kg and 2.0 kg, respectively. Target carcass weight for this system is 320 kg. Given that these animals are greater than 16 months of age at slaughter, the market outlet for these carcasses is more limited. Therefore, very close communication with meat processors is essential for the operation of this production system.

- 21-month steer system: For spring-born calves, winter finishing can be avoided by finishing steers (at lighter carcass weights) off pasture at the end of the second grazing season, after receiving concentrate supplementation for 60 days pre-slaughter. Concentrate input during the finishing phase for this system is 350 kg DM. Average DLWG gain during the second season at pasture is 1 kg. Calves need to have an early birth date (January/February) and must have a good lifetime performance for this system. Target carcass weight is 280 kg. For Holstein-Friesian steers carcass conformation scores are predominately P+ and O-, and fat scores 2=.
- 28-month steer system: Animals are at pasture for the second grazing season and are then housed and offered high quality grass silage *ad-libitum* only for the second winter. During this indoor period DLWG is typically 0.5kg. Steers are then turned out to pasture in late February/early March and slaughtered in June. Average daily gain during the third season at pasture is 1.2 kg. In this system steers achieve a carcass weight of 350 kg. Carcass conformation scores are predominately O= and fat scores 2=/2+.

Blueprints for spring born early maturing calf-to-beef production systems

Early-maturing dairy beef crossbred heifers and steers have the potential to achieve a commercially acceptable level of carcass fatness at a young age. Therefore, these genotypes should be suitable for systems of production that aim to finish animals at the end of the second grazing season producing saleable carcasses at a relatively light slaughter weight. Previous research carried out in Grange evaluated the merits of early and late-maturing dairy breed crossbred animals with the focus more recently on refining the early-maturing system blueprints as set out below.

- Early-maturing heifer production system: Heifers are at pasture for the first grazing season and housed in November and offered grass silage *ad-libitum* supplemented with 1.5-2.0 kg of concentrate daily depending on silage quality. After their first winter, heifers are turned out to pasture in early March and slaughtered off pasture in September, at 19 months of age, after receiving 2.5 kg concentrate DM daily for 60 days pre-slaughter. The target DLWG during the second season at pasture is 0.8 kg. Target carcass weight is 235 kg with carcass conformation scores of O+ and carcass fat scores of 3-. Results from Johnstown Castle have shown that all spring-born heifers should be finished before the second winter.
- 21-month early-maturing steer system: Steers are at pasture for the first grazing season and 'stored' during the first winter on grass silage *ad-libitum* supplemented with 1.5-2.0 kg of concentrate daily depending on silage quality. They are turned out to pasture for the second grazing season and slaughtered off pasture in November. Average daily gain during the second season at pasture is 0.8 kg. The target carcass weight in this system is 280 kg. Average carcass conformation score with O= and carcass fat score was 3-.
- 23-month early-maturing steer system: In this system cattle are at pasture for the second grazing season, housed and offered good quality grass silage *ad-libitum* supplemented with 5-6 kg of concentrates daily for 80 days pre-slaughter. Average daily gain during the finishing phase is 1.0kg. Target carcass weight is 300kg with carcass conformation score of O+ and fat score 3=.
- 26-month early-maturing steer system: Animals are at pasture for the second grazing season and are then housed and offered only grass silage *ad-libitum*, for the second winter. During this housing period DLWG is typically 0.5 kg. Steers are then turned out to pasture in late February/early March and slaughtered in June. Average DLWG during the third season at pasture is 1.3 kg. The target carcass weight is 320 kg with conformation and fat scores of O+ and 3+, respectively. This system is particularly well-suited to calves born in late spring (April/May) as winter finishing is avoided and a heavier carcass weight is achieved under grazing conditions.

Profitability of dairy calf-to-beef production systems

Figure 2 shows the net margin of the production systems described above based on a 20 ha (50 acre) beef enterprise farm area. Price assumptions were: male Holstein-Friesian calf purchase price, €100; early-maturing breed heifer calf, €240; early-maturing breed bull calf, €270; R3 steer beef carcass price, €4.00; and, finishing concentrate price, €255. Actual beef price payable depends on carcass grading (animal performance results generated at Johnstown Castle), seasonality (beef price being highest in May and lowest in September) and eligibility for quality assurance bonus. The breed bonuses were also included for the early-maturing breed production systems and the impact of a 30c/kg discount on the 19-month bull production system was also investigated.

Results clearly indicated that huge variation in profit exits across production systems. The 15-month Holstein-Friesian bull system has a very modest land requirement although it is important to bear in

mind the organic nitrogen and slurry contribution of these cattle with regard to the stocking rate and slurry capacity limitations of the Nitrates Directive. The 15-month Holstein-Friesian bull system was the least profitable on a per head and per hectare basis. Although the traditional production systems for male dairy calves and early-maturing breed heifer and steer production systems were profitable, grass-based production systems, where animals were slaughtered in November before the second winter or in June during their third grazing season, were the most profitable. Although the 19-month Holstein-Friesian bull is one of the more profitable systems, the impact of a discount in beef price has the potential to render it one of the least profitable systems. For this system it is essential that close communication with meat processors is established and maintained.

Sensitivity analysis

Aside from grass production and utilisation the main contributors that affect farm profitability of dairy calf-to-beef systems are concentrate costs, calf purchase price and beef carcass price. Although all of these factors affect each production system described above, the level of impact varies greatly between them. For example, dairy bulls in the 15-month production system are most sensitive to changes in concentrate price. A €10 per tonne increase in concentrate price reduces gross margin by €18 per head. On the other hand, the 19-month bull system was most sensitive to beef price with a 10 c/kg increase/decrease in beef price increasing/reducing gross margin by €32 per head. Early-maturing breed heifer production systems and pasture-finished steers were least sensitive to concentrate and beef price. Fluctuations in beef price, concentrate price and calf price did not result in any re-ranking between the production systems within the price ranges explored. Current research at Johnstown Castle is evaluating the impact of stocking rate on dairy calf-to-beef systems.

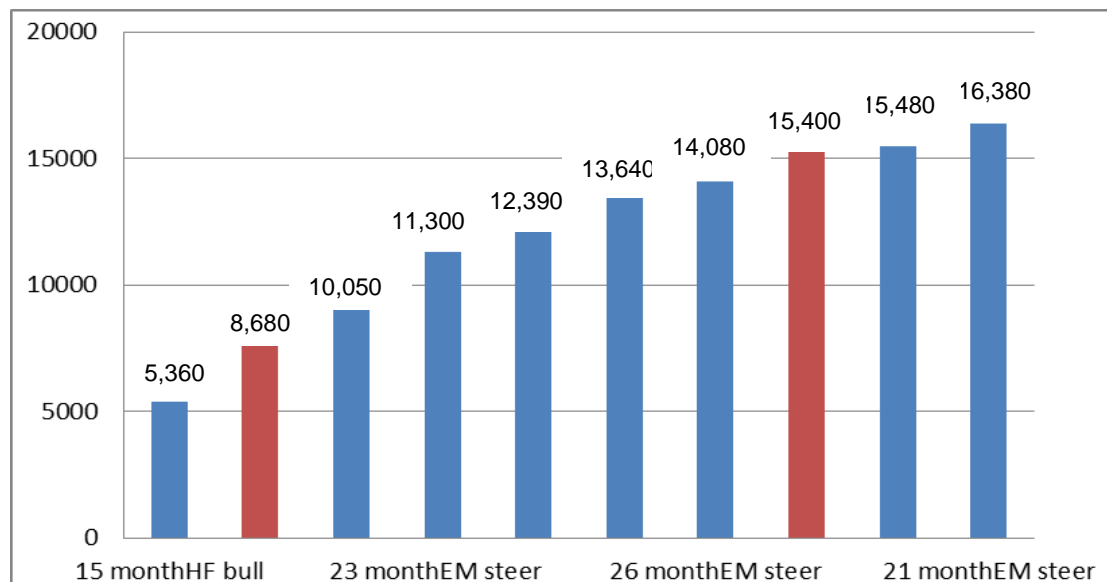


Figure 2. Net farm profit (€), Profitability of dairy calf-to-beef production systems based on a 20 hectare beef enterprise farm area. HF= Holstein-Friesian and EM= early-maturing (Angus and Hereford dairy crossbred animals) and breed bonuses are included in the early maturing production systems.

Farm management and cash flow

From a farm management (utilisations of grazed grass and silage, availability of housing etc.) and cash flow perspective, beef producers normally operate more than one production system. It also ensures a number of sale dates through the year. Even with the most profitable production systems, operating a single system can be a challenge. For example, if a beef producer operates a 21-month steer production system grass demand in the spring is low because the yearlings will be approximately 320 kg at turnout with a modest grazing demand (6-7 kg DM per head) and spring-born calves will have no demand for grazed grass until after turnout in May/June. In addition, because these steers are slaughtered before the second winter the requirement for grass silage is significantly reduced. In this scenario having a proportion of steers carried through the second winter and slaughtered during their third season at pasture would complement the 21-month steer system. This

would also result in a sale date for these animals that typically coincides with higher beef prices in June/July.

Herbage production

A key element of profitable dairy calf-to-beef systems is the efficient utilisation of grazed grass. Figure 3 highlights the variation in the feed budgets for grass, grass silage and concentrates for each production system. Each system has a different requirement for grass herbage per head ranging from 2.3 t DM for the 19-month heifer systems to 4.3 t DM for the 26-month steer system (Figure 3). At a stocking rate of 200 kg organic N per hectare and assuming excellent levels of grass utilisation, the farm would need to grow between 10.1 t DM/ha and 11.6 t DM/ha for each of these systems, respectively. Thus, the capacity of the farm to grow grass will largely dictate the stock carrying potential of the farm.

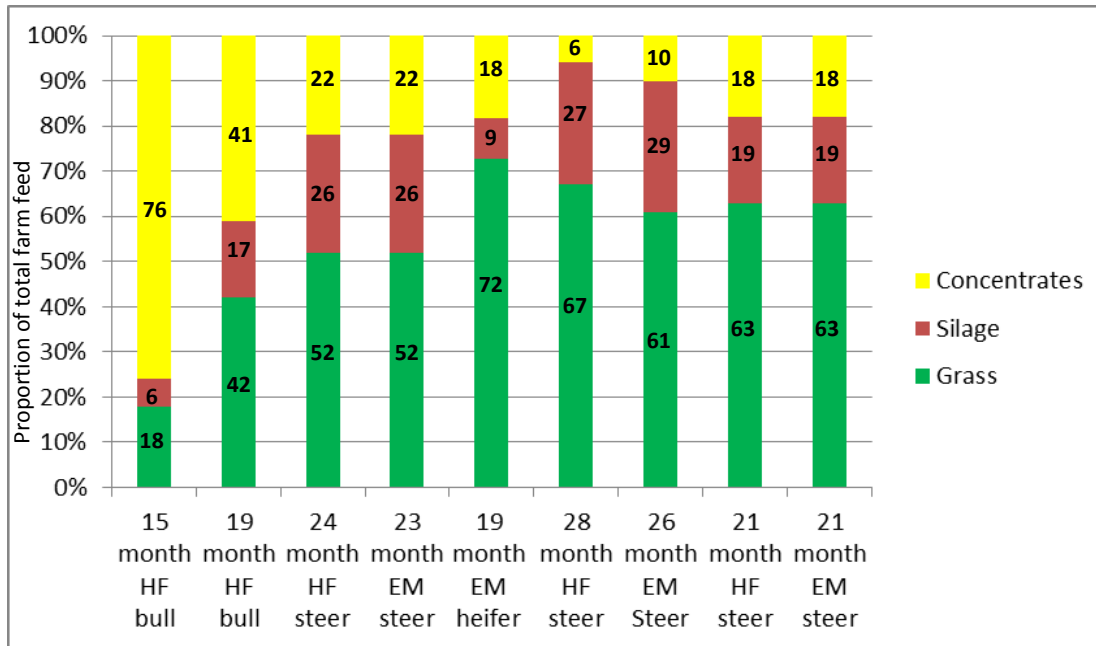


Figure 3. Feed budget for Holstein-Friesian and early-maturing dairy beef crossbred production systems. HF= Holstein-Friesian and EM= early-maturing (Angus and Hereford dairy crossbred animals).

Conclusion

Various production systems can be employed on dairy calf-to-beef enterprises depending on the breed type, gender and finishing system. The most successful systems are those that optimise animal performance from grazed pasture and achieve a high proportion of total life time gain from grazed grass. Profitability is vulnerable to increases in concentrate input costs and calf purchase price, as well as the selling price (including bonuses) of beef. It is also important to realise that farm profit varies depending on the production system which in turn is influenced by the breed of the calf that is purchased.

The above article was adapted and reproduced courtesy of Teagasc.

Footnote comment from Simon Marsh, Principal Lecturer – Beef Cattle Specialist, Harper Adams University.

You will note in the above article that the Holstein-Friesian bulls finished at 15 months were grazed as calves from June to October. They were housed from November and fed ad lib concentrates through to slaughter in May/June. Total concentrate intake is 2.1t with a carcass weight of 265kg. At Harper Adams Holstein-Friesian bull calves are reared on a traditional cereal beef system housed throughout their life and fed ad lib concentrates. The bulls are typically slaughtered at 13-14 months old with carcass weights of 285kg having eaten 2.55t of concentrates.

The 19 month bull system will not be viable in the UK due to the lack of market outlets for these cattle. Also consideration must be given to health and safety factors with the management of yearling bulls at grass. Section 59 of the Wildlife and Countryside Act 1981 states that bulls of a recognised dairy breed over 10 months old should not be grazed in fields crossed by public rights of way. I can also foresee a lot of 'management issues' dealing with a mob of 18-19 month old Holstein bulls at pasture!

The black and white steers finished at 21 months off grass have target carcass weight of 280kg. Most UK abattoirs penalise light-weight carcasses with penalties of 40-90p/kg for carcasses below 260kg for O-to P- grades. With a mean carcass weight of 280kg approximately 20% would therefore be below 260kg and penalised. It is stated that concentrates will need to be fed for 60 days pre-slaughter however there may be an issue with a lack of fat cover, especially with Holstein type steers which may demand relatively high levels of concentrates if grazing quality is inadequate.

You will note in the above article that the Early Maturing heifers finished at 19 months off grass have a target carcass weight of only 230kg. As discussed above some abattoirs penalise light-weight carcasses. Consideration must therefore be given to marketing these cattle with the objective to sell them to a processor involved in a native breed premium scheme or a boxed beef scheme.

How much of a threat will it be to the UK beef industry with the recent expansion of the Irish dairy herd with more dairy bred beef calves being born? Some pundits predict a decline in the Irish beef suckler herd so it could balance out. Also the dairy bred calves (black and white males together with an increased number of native breed x Holstein steers and heifers) will have lower carcass weights than suckler bred calves.