High-quality ewes milk for high-quality lambs

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Published in:
Farming Connect

Publication date:
2019

Citation for published version (APA):
Williams, C. (2019). High-quality ewes milk for high-quality lambs. *Farming Connect*.

High-quality ewes milk for high-quality lambs

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- Good quality and quantity of colostrum and milk are vital to ensure lamb survival, health and productivity, all of which feed into better profits for the farmer.
- Body condition scoring and litter size can be used to group ewes and tailor their nutrition which will ensure good quality and quantity of milk.
- Selecting for good udder and teat conformation will help to reduce the risk of mastitis and improve the ewe's milking ability, which boosts lamb growth rates.

As many sheep farmers already know, there is a direct connection between the quality of the ewe's milk and the quality of the lambs produced. A good supply of quality colostrum and milk is vital for efficient production and lamb survival. Pregnancy and birth are a challenging time for the ewe as feed intake decreases in the weeks leading up to birth, yet the demand for nutrients is higher than ever. For optimum performance it is important to provide good quality feed of the correct type and according to the ewe's litter size, body condition score and breed.

The importance of good colostrum and milk

Colostrum or 'first milk' is the key to lamb survival, it contains approximately 77 g/kg of fat which helps the lamb to maintain its body temperature and provides a kick start to the lamb's nutrition. Colostrum also contains around 71 g/kg of protein (essential for growth) and vital antibodies that protect the lamb from disease and form the basis for its own immune system. It is helpful to bear in mind three rules with regards to colostrum: it should be fed in the first 6 hours after birth, it should be of good quality and the lamb should receive a minimum of 210 ml per kg.

After the first 24 hours post-partum, colostrum is progressively diluted as the ewe's milk comes through. Lambs will rely completely upon the ewe's milk for a relatively short period of time – from around a week old they may begin nibbling on solid food, by 6 weeks old lambs can be taking up to 50% of their nutrients from solids and finally at 8-12 weeks old should be ready for weaning. At birth, the lamb's digestive tract is

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immature and unable to digest anything but milk, during this time the rumen and other chambers of the stomach develop considerably to prepare the lamb for a life of eating.

Lambs can gain around 300 g per day (a recommended minimum of 250 g) when drinking milk, placing a significant demand on the ewe. Ewe's milk contains a high level of fat and protein, especially when compared to cow's milk, to support the rapid development of their offspring. Key minerals include calcium and phosphorous (bone growth and formation) and potassium and sodium (muscle and nerve function). Ewe's milk also provides a good source of folate, a vitamin needed for cell division and therefore, growth. All of these components come together to provide exactly what a lamb needs to grow rapidly.

Research comparing artificially reared lambs using milk replacer versus those reared either using ewe's milk or naturally have indicated significant differences in the carcass at slaughter. Lambs reared by the ewe tend to grow faster than those reared artificially which results in a higher carcass weight overall. The study noted a difference of 0.85 kg in carcass weight and a 2% decrease in carcass yield from artificially reared lambs. Artificially reared lambs also produced darker, leaner meat with a higher moisture content than their naturally reared counterparts. These characteristics may be undesirable to the consumer as a darker colour often indicates an older animal and too little fat or too much moisture can alter the taste of the lamb. The rearing system also had a considerable effect on the fatty acid profile of the meat: those reared naturally had higher levels of health-beneficial conjugated fatty acids and a more favourable

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fat profile overall. Meat from lambs reared artificially, on the other hand, contained a different type of health beneficial fatty acid (C18:2, *n-6*) with a lower proportion of saturated fats. Whilst meat from lambs reared under both conditions excelled in different ways, overall the nutritional value of those reared naturally was superior due to the more favourable saturated: unsaturated fat ratio.

Additionally, ewes with multiple lambs produce more milk than those with singles: ewes with twins produce 13% to 17% more milk than those with singles. The litter size also has an effect on colostrum and milk fat levels for up to 4 days post-partum, as ewes with twins produced milk with 14% to 20% higher fat content when compared to those with singles. Balancing the litter size in terms of productivity and lamb survival is important. Whilst ewes do not produce as much milk with singles and can easily raise twins, often the same cannot be said of litters containing more than three lambs. Single or twin lambs have a survival rate 2.5 times better than that of lambs from large litters (3+). It is also well established that lambs of large litters are smaller and achieve lower weaning weights than twins or singles. When the ewe cannot rear a large litter, lambs will either be fostered onto another ewe or bottle-fed – both of which require an investment of time and money by the farmer. It may therefore be wise to avoid large litters and instead limit ewes to twins or triplets to maximise productivity and profitablity. Whilst it may seem counter intuitive to reduce quantity, the quality of the lambs is just as important.

A recent finding from dairy sheep suggests that ewes with ram lambs produce less milk than those with ewe lambs, be that single or twins. It is thought that this is due to the expression of different hormones by male and female foetuses. This finding may be significant for farmers of dairy sheep as a method of boosting milk production and also demonstrates the impact that variations during pregnancy can have on the lamb post-partum.

Achieving a good quality and quantity of milk

Feeding

The nutrition of the ewe during pregnancy is key, as it dictates the quality of lambs produced, the ewe's health and the volume and quality of milk the ewe will provide.

Particularly during the later phases of pregnancy where 80% of lamb growth occurs studies have found that under- and over-feeding significantly impacts milk production.

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The nutrient requirements of the pregnant ewe increase by 50% in those carrying singles and 70% with twins in these final 2 months. Protein demands, in particular, will rocket in order to fuel the rapid growth of lambs and their wool development. It is well established that better-nourished ewes produce more milk for a longer period, which contributes directly to increased lamb growth rate as well as their own weight gain. Beyond the first breeding cycle, it has been established that nutrition of the ewe can impact the fertility and weaning weights of her grand-offspring which may ultimately affect future profitability.

Body condition scoring (BCS) is a rapid and inexpensive method of assessing the ewe's nutritional needs, it is especially useful when combined with the litter size established by ultrasound. The target BCS varies with the environment, but in general, will fall between 2 and 3 (table 1).

Stage in cycle	Hill	Upland	Lowland
Weaning	2	2	2.5
Tupping	2.5	3	3
Mid-pregnancy	2	2.5	3
Late pregnancy	2	2.5	3

Table 1: Optimum BCS for hill, lowland and upland ewes at various stages in the reproductive cycle.

Using this information the farmer may split the flock so that targeted feeding can be provided. For example, those with a low BCS or carrying triplets, may need different feed than ewes that are overweight or carrying single lambs. To confirm or refine BCS, metabolic profiling may be used which provides information about the animal's health and nutritional status using a blood sample. Metabolic profiling can be used to analyse the entire flock through pooled samples and provides in depth detail about the ewe's needs which might otherwise be missed.

Under-nutrition of outdoor ewes is common during pregnancy due to the lack of nutrient-rich grazing in the winter and reduced feed intake (as the lambs take up more space in the body cavity there is less space for the rumen). Ewes that are underweight before mating do not cope as well during pregnancy, as they have less fat reserves to draw upon. Underweight ewes may also experience low lamb birth weights/survival and produce low quality colostrum and milk. A temptation may be to overfeed to ensure that ewes receive the nutrition that they need and try to maximise lamb birth weight. However, an overweight ewe with a BCS of more than 3.5 may struggle to fall pregnant, and if

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successful, problems such as pregnancy toxaemia, delayed lactation and difficulties when lambing (dystocia and oversized lambs) are highly likely.

A significant amount of udder development also occurs during the last month of pregnancy, inadequate nutrition can result in reduced quality and quantity of colostrum and milk and often a delay in lactation. This is because undernutrition during this period has a knock-on effect on pregnancy hormones, for example, a drop in progesterone is essential for the development of the mammary gland which can be delayed by poor nutrition.

The Agriculture and Horticulture Development Board (ADHB) provides formulae for the calculation of appropriate ewe rations which can be used in conjunction with silage analysis and feed information to ensure delivery of the correct nutrition.

Breed

Sheep breed can account for some differences in milk yield and qualities as well as litter size and mothering ability. This is reflected in the use of specific breeds of dairy sheep (*e.g.* Zwartbles, Lacaune, British Milk sheep or East Friesian) over those raised for meat or wool. For instance, the Awassi dairy sheep can produce up to 1000 L of milk in a lactation, compared to the Poll Dorset which produces just 150 L.

Nevertheless, there is a balancing act between volume and quality of milk, generally as the volume of milk increases, desirable qualities such as fat and protein decrease. This is of most concern in the dairy industry, but could also be a problem in the meat industry too, as ewes can sometimes produce large litters which they are unable to feed. Monitoring the milk supply of ewes with triplets (or more) or those with a low BCS at lambing will allow quick intervention where necessary – for example, in an indoor system, if the ewe is moved to an individual lambing pen, colostrum can be checked whilst also recording key information about the birthing and lambs.

Climatic Conditions

It is well established that harsh weather can contribute significantly to lamb loss and ewe health, but it also has an effect on milk yield. Demonstrated in studies using dairy sheep breeds, research has found that climate can influence milk yield. Particularly in ewes with a low BCS, who will have fewer fat reserves to rely on to keep warm and provide nutrients to the foetus/produce milk for her lambs. Breed also has an effect on how the ewe copes,

as hardier breeds that are better adapted for living outside in severe weather may be able to cope better with undernutrition at the beginning of pregnancy compared to breeds that are selected for growth.

A study using dairy sheep revealed that cold stress significantly affected milk yield and composition. As the temperature decreased below 10°C so did milk yield, milk fat and milk protein with high yielding animals feeling the effects sooner. The study concluded that although of small magnitude, adverse climatic conditions can impact negatively on farm profits. Indoor and outdoor lambing systems both offer their own set of unique advantages and disadvantages and it is, therefore, important to match the breed of sheep to the farming system to ensure maximum productivity and minimal losses.

Mastitis

Mastitis can present a considerable challenge for both sheep and cattle farmers. This inflammation of the udder is caused by a bacterial or viral infection and can present as sub-clinical (low-grade), clinical (high-grade, obvious symptoms), acute (rapid onset) or chronic (long-term). Classic symptoms include pain, lameness, hardness in the udder and abnormal milk. Sub-clinical symptoms include decreased quantity and quality of milk, which leads to poor lamb growth rates and the potential for abscesses or masses to occur in the udder. Abscesses often leave behind scarring, which can significantly reduce milk yield and will continue to do so in the future. Regardless of whether the ewe has a full udder, the milk cannot be drawn out due to these blockages. Studies investigating subclinical mastitis in sheep found that milk yield was reduced by 47% in those with mastitis when compared to healthy ewes, in addition to significantly increased somatic cell counts (SSCs). Milk from infected ewes also had a different profile, as it contained less fat and protein, which greatly reduces its nutritional value.

As with many diseases, prevention is better than a cure. The risk of mastitis can be reduced through adequate nutrition, maintaining a good BCS, practising good hygiene at lambing and examination of the udder at weaning or tupping. An examination will reveal the presence of any masses, scarring or lesions and can whittle out ewes with poor udder conformation. Good udder conformation will significantly reduce the risk of mastitis and will contribute to lamb growth rates (figures 1-2). Selecting for good udder conformation whilst simultaneously culling older ewes or those with poor conformation will help ensure productive ewes in the coming years (figures 1-2).

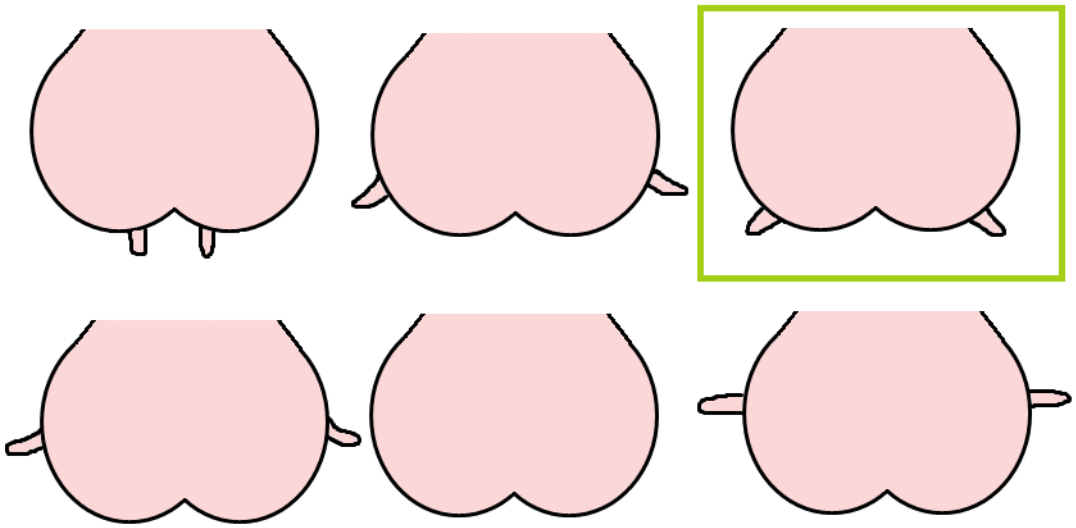

Figure 1: Placement of the teats on the udder from a vertical view, green box shows optimal conformation.

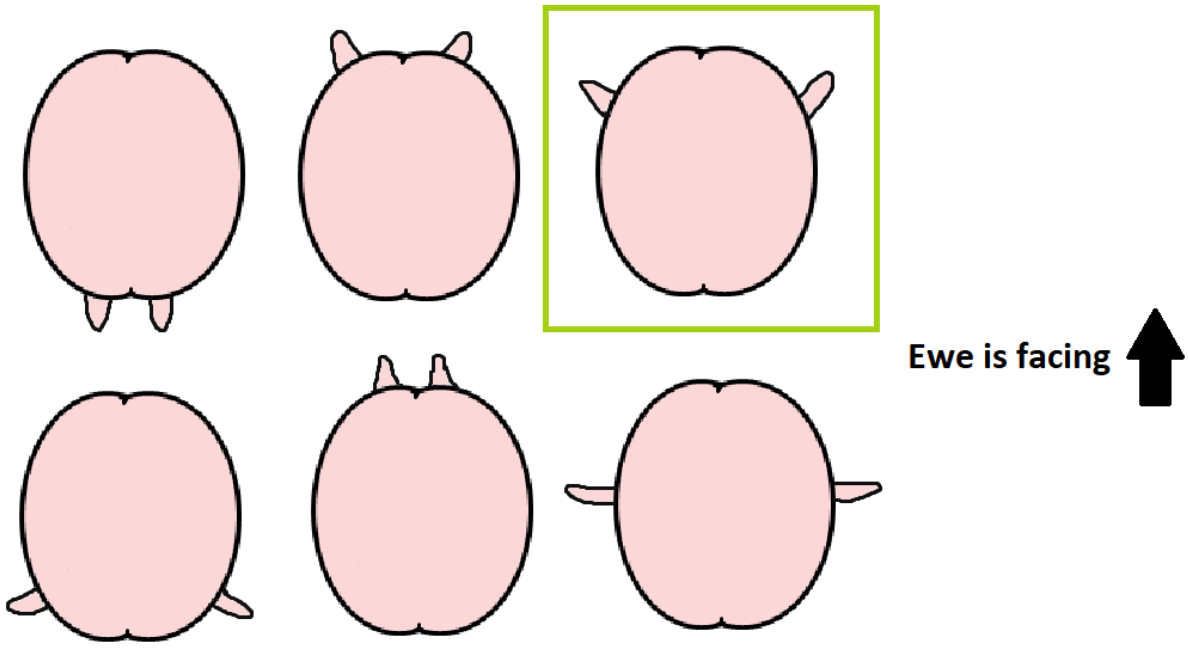

Figure 2: Placement of the teats on the udder on a horizontal plane, with the ewe facing upwards; green box shows optimal conformation.

Summary

The milking ability of the ewe and production of quality colostrum is pivotal in her productivity – to produce healthy and vigorous lambs that grow rapidly. Adequate nutrition is the main factor affecting milk production and quality but will also reduce the risk of mastitis and many other health problems. Scanning ewes to determine litter size and recording BCS can help the farmer to correctly allocate ewes into groups so that feeding can be targeted – which is particularly important in the final two months of pregnancy. Selection for ewes with good udder conformation can help increase lamb growth rates considerably and will also reduce the risk of mastitis – helping to build a flock of productive and efficient ewes.

June 2019

Note to editors:

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Background information:
This project has received funding through the Welsh Government Rural Communities - Rural Development Programme 2014-2020, which is funded by the European Agricultural Fund for Rural Development and the Welsh Government.

The Farming Connect Knowledge Transfer Programme and Advisory Service are delivered by Menter a Busnes on behalf of Welsh Government. Lantra Wales leads on the delivery of the Farming Connect Lifelong Learning and Development Programme.

Keywords: sheep, milk, ewes, colostrum, lambs, lambing, quality, BCS, body condition score, feeding, feed, nutrition.

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