

The Colostrum Counsel

To ensure proper immunity, energy and overall health, it is important to feed the correct amount of good quality colostrum to calves. However, it can be challenging to understand the proper treatment for each size of calf, especially smaller calves, in order to maximize these health benefits.



The Colostrum Counsel: Feeding Colostrum to Smaller Calves

It is well known that feeding a sufficient volume of good-quality colostrum is one of the single most important factors in ensuring the health and well-being of a newborn calf. Current recommendations are to feed colostrum at 10% of birth body weight in the first hours of life to ensure the passive transfer of IgG. However, it is time-consuming for producers to weigh each calf after birth and calculate the amount of colostrum to be fed. This results in the majority of producers standardizing the amount of colostrum fed to all newborns, such as feeding 4L of colostrum immediately after birth, then 2L 12 hours later. But, should you be feeding twin 25kg Holstein calves the same 4L meal size immediately after birth that you would feed an average size, 40kg Holstein calf? This question may also be asked for smaller breeds, such as Jerseys, or small Hereford or Angus calves. So, how much colostrum is too much and what are the consequences?

Absorption of IgG in Small Calves

The rate of IgG absorption can actually be affected depending on the volume of colostrum fed to a small calf. For instance, a study using newborn Jersey calves demonstrated that feeding a 2L meal of high-

quality (84g of IgG per L) colostrum immediately after birth followed by a second 2L meal of the same colostrum at 12h after birth resulted in higher blood IgG concentrations compared to calves fed one large 4L meal of high-quality colostrum immediately after birth (Jaster, 2005). Specifically, it was shown that the amount of IgG absorbed from colostrum was 18% higher when Jersey calves were fed two smaller meals of colostrum. It is suggested that this finding may have occurred because there is a maximum amount of IgG that can be absorbed by the calf gut. Thus, providing an excess amount of colostrum (and IgG) may actually cause an inhibition of IgG absorption.

Although not mentioned, abomasal emptying rate may have played a role in the efficacy of absorption of IgG in Jaster (2005), as the apparent efficiency of absorption (AEA (%), how much IgG from colostrum is absorbed by the small intestine) was also higher in the Jersey calves fed 2L twice within 12hrs. By definition, abomasal emptying is known as the amount of time that the meal remains in the abomasum before passing into the intestinal tract (Burgstaller et al., 2017) and it has been shown that the volume of a liquid meal is an important factor that can affect the rate of abomasal emptying in young ruminants (Bell & Razig, 1973). Specifically, it has been demonstrated that the greater the volume of the meal offered to a calf in a single feeding, the longer the meal will remain in the abomasum (Burgstaller et al., 2017). Delaying the abomasal emptying rate has been shown to decrease the

AEA of IgG (Mokhber-Dezfooli et al., 2012). Therefore, it is likely that feeding a Jersey calf a 4L meal all at once will decrease abomasal emptying and therefore decrease the efficiency of absorption of IgG compared to feeding a smaller 2L meal.

Method of Feeding

The findings of Jaster (2005) using Jersey calves are opposite to those found in an experiment that used Holstein calves (Morin et al., 1997). This demonstrates that the body weight of a calf plays a crucial role in how much IgG can be absorbed from colostrum. However, when feeding smaller meals the method of colostrum feeding can actually have an effect on the amount of IgG absorbed. A study using Holstein bull calves demonstrated that feeding 1.5L of a colostrum replacer (100g of IgG total) by nipple bottle resulted in higher blood IgG concentrations compared to calves fed 1.5L by esophageal tube feeder (Godden et al., 2009). Moreover, all calves fed 1.5L of colostrum by nipple bottle achieved adequate passive transfer (serum IgG \geq 10mg/ml), while 58.3% of calves fed 1.5L by esophageal tube had failure of passive transfer.

Although using an esophageal tube feeder is time efficient and convenient for the producer, it is well known that the esophageal groove is not triggered when suckling from a nipple does not occur, resulting in colostrum deposition directly into the reticulorumen (Godden et al., 2009). Due to this phenomena, the authors hypothesized that calves fed 1.5L by esophageal tube feeder had lower concentrations of IgG because the majority of the meal was deposited in the reticulorumen, which has the capacity to hold ~1L of liquid, resulting in a delay of colostrum emptying from the abomasum. Therefore, in order to prevent a delay in the delivery of IgG to the small intestine for absorption, and the failure of passive transfer, it is recommended that a 2L meal of colostrum be fed by nipple bottle and that any refusals be fed by esophageal tube feeder if necessary.

Take Home Messages

In addition to taking into consideration the volume of colostrum to feed and the method used, it is always important to feed colostrum as soon as possible after birth, as well as to use good quality colostrum containing more than 50g of IgG per liter in order to achieve successful passive transfer. Unfortunately, analysis of colostrum to determine IgG concentrations can be time consuming and is not easily done, resulting in only ~13% of producers routinely evaluating the quality of colostrum, with half of those estimating the quality solely based off of visual inspection (NAHMS, 2007). Since the quantity of IgG fed to the calf needs to be sufficient (\geq 100g of IgG total) in order to ensure passive transfer, colostrum replacer may be considered as a viable

option. For smaller calves, such as Jerseys or any calves weighing less than 30kg, it is recommended to feed a colostrum replacer at a rate which delivers 2L containing as much IgG as possible - especially if tube feeding these meals - and to repeat the same feeding 8-12hrs later. This will ensure that the small newborn will achieve maximum absorption of the important nutritional and immune factors in colostrum, resulting in a healthy calf.

References

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