



A Guide To Colostrum And Colostrum Management

In the wild, cattle were prey animals. For survival of the species, it was critical that a newborn calf quickly learn to run. The priority in fetal development was building muscles. Big predators, not microscopic pathogens, was the main concern.

The calf only starts developing a functional immune system after several weeks. Nature compensates for this lack with colostrum. The dam produces antibodies (immunoglobins) to various diseases and pathogens. Exposure of the dam to these antigens and vaccinations result in specific immunoglobins (IGs) that are transferred into colostrum from the maternal blood. Unfortunately, she cannot pass these antibodies directly to her calf across the placenta. Colostrum or first milk is her means of providing vital nutrients and IGs to the calf. Table 1 shows the typical composition of colostrum and milk.

TABLE 1. Colostrum And Milk Composition

Item	Milking Number			Normal Milk
	1	2	3	
Specific Gravity	1.056	1.040	1.035	1.032
Total Solids (%)	23.9	17.9	14.1	12.9
Protein (%)	14.0	8.4	5.1	3.0
IgGs (mg/ml)	6.7	5.4	3.9	3.7
Lactose (%)	2.7	3.9	4.4	5.0
Vit. A (ug/ml)	2,950	1,900	1,130	340

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To develop a good passive immunity, a calf should have 10 milligrams of IG/milliliter of plasma. A 1994 sampling of blood from 2,177 heifer calves from farms across the U.S. showed 41% of the calves did not acquire this level of protection. Table 2 shows the effect of acquiring adequate passive immunity and calf survival.

TABLE 2. Summary Of Antibody Levels And Calf Mortality

Antibody Level In Plasma	No. Of Calves	Calves Surviving Until Weaning
Low (<7 mg/ml)	24	29%
Medium (7-10 mg/ml)	18	72%
High (>10 mg/ml)	141	94%

Feed It Quickly

Acquiring passive immunity is a one day event. IG absorption efficiency starts to decline within hours of birth and is essentially zero at 24 hours of age. Also, digestive enzymes start to function shortly after birth, and they digest the IGs before they can be absorbed. Sometimes it becomes a race as to which reaches the small intestine first – the IGs or harmful bacteria. For a variety of reasons it is recommended to hand feed the colostrum rather than let the calf nurse.

How Much Colostrum?

Studies have shown a calf should be fed about 100 mg of IG to have adequate protection. Colostrum from Holsteins has an average of about 50 grams per quart. This can vary from 20 to over 100 grams but is usually on the lower side. For the first feeding within two hours of birth, feed the calf all it will drink. A University of Illinois study found better calf gains when they received a gallon versus two quarts of colostrum. Also, during the first day this extra colostrum does not promote scours partly due to its lower lactose content. Calves weighing less than 80 lbs at birth should be fed less.

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A Wisconsin study with every other Brown Swiss calf compared feeding either two or four quarts of colostrum at birth. Thereafter, the heifers were managed and fed the same throughout their lives. The calves fed four quarts of colostrum produced about two lbs more milk per day through their first two lactations. Also, the culling rates of the calves fed two quarts through two lactations were 24.3% versus 12.9% fed four quarts.

If the calf won't drink, then force feeding with an esophageal feeder can be done. A disadvantage with the esophageal feeder is that the colostrum is deposited in the rumen and it can take up to three hours to reach the small intestine where the IGs are absorbed. Ideally, another two quarts should be fed 6-12 hours after birth.

Colostrum Quality

Not all colostrum is created equal. The use of a colostrometer that measures specific gravity or density of colostrum may be helpful. Generally, the thicker the colostrum the better the quality. This provides only a guide, and feeding plenty of colostrum soon after birth is your best practice.

Older cows have usually been exposed to more pathogens; thus, they have developed more IGs. Cows new to the farm have probably not developed the IGs to pathogens on your farm. As a breed, Holsteins usually have less IGs than other breeds.

Cows that have been milked before calving or leak milk usually have much lower quality colostrum. Because of possible disease transfer, do not mix colostrum from several cows or cows testing positive for Johne's Disease or mycoplasma.

Freezing colostrum is an excellent method of storage for up to one year. Frost-free freezers are not optimal as they go through freeze/thaw cycles. Frozen colostrum should be thawed gently (15-20 minutes). It is best to freeze two quarts in a bigger zip lock bag and store as a flat package. Freezing does destroy the white blood cells but frozen colostrum is better than no colostrum. Colostrum supplements or replacers can substitute when only poor quality colostrum is available or it is inconvenient to obtain the dam's colostrum.

Dystocia

Severe dystocia decreases the ability of the calf to absorb IGs. Calves that have undergone difficult birthing and often very large calves have significantly lower concentrations of IG in plasma compared to normal births when fed the same amount of colostrum. In a study of 658 calves born with some degree of dystocia, 25% died within 48 hours. Prolonged births cause acidosis and reduce tissue oxygen levels (hypoxia). Extra care and colostrum are needed to minimize death loss in this situation.