



Dairy Pipeline

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Colostrum Management and Storage for Healthy Calves

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The key to a newborn calf's health lies in colostrum. This first milk, bursting with nutrients and vital antibodies, is more than just food—it is a lifeline. In this article, the vital role of colostrum will be explored, with a special emphasis on Immunoglobulin G (IgG) and its significance in calf immunity. Furthermore, the challenges associated with preserving colostrum, including bacterial contamination, pasteurization, and storage will be examined.

What is Colostrum and Why is It Important?

Colostrum is the first form of milk that a cow produces immediately after calving. The IgG in colostrum plays a pivotal role in the calf's early life—it is the primary antibody responsible for providing passive immunity to the newborn. Calves are born with immature immune systems and the IgG in colostrum acts as a vital shield, protecting them against various infections and diseases. The concentration of IgG in colostrum is remarkably high, which is why this first meal is indispensable for the health and survival of the calf. Safe collection, processing, and storage are critical in order to maintain these benefits for the calf.

Contamination Concerns and the Necessity of Pasteurization

While colostrum is a powerhouse of nutrients and antibodies, it is susceptible to contamination risks. Like any dairy product, colostrum can be tainted by harmful bacteria, such as *E. coli* or *Salmonella*, or by environmental pollutants. These contaminants can stem from various sources, including unhygienic milking practices, improper handling, or exposure to contaminated environments. This is where pasteurization comes into play. Similar to pasteurization of saleable milk, pasteurization of colostrum involves carefully raising the temperature to a level that is effective for the removal of pathogenic bacteria, but without significantly compromising valuable nutrients and the fragile IgG antibodies. This process is a delicate balancing act: too little heat allows the harmful bacteria to survive, while too much heat can denature the antibodies, diminishing the colostrum's immune-boosting properties. Therefore, precise control of temperature and duration 140°F for 30 to 60 minutes is critical in the pasteurization process to ensure that colostrum remains both safe and beneficial for a newborn calf.

Storage Solutions: Refrigeration and Freezing

Proper storage of colostrum is essential not only to maintain nutritional value but also to preserve vital IgG content. There are primarily two effective storage methods: refrigeration and freezing.

Storing colostrum at 39.2°F is a widely accepted method. This temperature can preserve IgG, but attention to storage duration is crucial. Bacterial proliferation may occur over time, potentially

affecting colostrum integrity. Nevertheless, research indicates that colostrum stored for less than two days in the refrigerator does not negatively impact IgG absorption or calf growth before weaning (Cummins et al., 2017). If longer storage is needed, freezing presents a viable option to preserve the colostrum's protective qualities until it can be fed to the calf.

When colostrum is frozen, its essential nutrients and IgG are preserved. Even so, the thawing process is crucial for maintaining its quality. Researchers have explored how various thawing methods affect IgG (Balthazar et al., 2015). Gentle thawing is vital and a low temperature should be used to maintain the IgG. A common method is using a water bath set around 98.6°F, which is close to the natural body temperature of cows. This method avoids the risk of overheating and ensures the IgG remains stable. In contrast, heating colostrum above 140°F can lead to a significant denaturation of IgG proteins, diminishing its immune-boosting qualities. Microwaving colostrum is another option, but it requires caution. Using lower microwave settings (around 200 Watts) is advisable, as higher power can cause a significant IgG loss.

The importance of colostrum in the health of the newborn calf cannot be overstated. Its nutrients and IgG are fundamental to establishing calf immunity. Despite the challenges posed by bacterial contamination and storage complexities, preserving colostrum is essential for calf well-being. Ensuring optimal management practices addresses these challenges, paving the way for a promising start for every calf at the farm.



A healthy Jersey calf at a calf hutch.

DHI and Herd Management Goals – HOLSTEINS – August 2024

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Industry benchmarks can be helpful in evaluating current dairy herd management. They can also inform decisions related to goal setting, which should be a regular part of herd management. Goals should be SMART (specific, measurable, achievable, rewarding, and timed), written down, and regularly reviewed to monitor progress. If a herd is not achieving goals in a particular area, managers should investigate to determine why, then identify the best course of action to improve the situation.

The following information contains regional average data and was generated using DairyMetrics from Dairy Records Management Systems. It is based on Holstein herds in a six-state area (Virginia, Kentucky, Maryland, North Carolina, and West Virginia).

Table 1. Genetics.

Parameter	Unit	Regional Average	Suggested Goal
Percent of herd bred AI	%	53	100
Percent of herd bred with AI genomic tested sires	%	***	≥ 30
Percentile rank - service sires	percentile	54	≥ 90
Cows with sire ID	%	***	100
Heifers with sire ID	%	***	100

Table 2. Milk and Components.

Parameter	Unit	Regional Average	Suggested Goal
Daily milk - milking cows	lb	74.0	**
Daily milk - all cows	lb	63.7	**
Summit milk - 1st lactation	lb	76.8	**
Summit milk - 2nd lactation	lb	95.7	**
Summit milk - 3rd+ lactations	lb	103.4	**
Peak milk - 1st lactation	lb	80	**
Peak milk - 2nd lactation	lb	100	**
Peak milk - 3rd+ lactations	lb	108	**
Rolling yearly herd average - milk	lb	24,328	**
Rolling yearly herd average - fat	lb	967	**
Rolling yearly herd average - protein	lb	758	**
Fat percent	%	3.9	≥ 3.7
Protein percent	%	3.0	≥ 3.0
Persistency after peak - 1st lactation*	%		~ 95
Persistency after peak - older cows*	%		~ 90
% 1st lactation ≤ 40 lbs on 1st test day*	%		0
% older cows ≤ 50 lbs on 1st test day*	%		0

Production Rules of Thumb

First lactation peaks should be ~75% of older cows.
 First lactation 305 day ME milk should be within 500 pounds of second lactation.
 Standardized 150 day milk declines > 5 pounds are indicative of a problem.

Table 3. Reproduction.

Parameter	Unit	Regional Average	Suggested Goal
Pregnancy rate	%	17	≥ 24
Days open	days	151	≤ 130
Projected calving interval	months	14.2	≤ 13.6
Average days to 1st service	days	96	≤ 75
Percent of all 1st services < VWP	%	12	≤ 10
Percent of all 1st services > 100 days	%	30	≤ 10
Heats observed	%	42	≥ 65
Yearly successful services	%	***	≥ 40
Successful 1st services	%	46	≥ 45
Services per pregnancy	number	2.7	≤ 2.5
Percent of herd confirmed pregnant	%	***	≥ 50
Difficult births - 1st lactation (scores 4+5)	%	1.1	≤ 5
Cows culled for reproduction	%	15	≤ 6
Abortions (actual + apparent)	%	***	≤ 5

Table 4. Culling.

Parameter	Unit	Regional Average	Suggested Goal
Cows left herd	%	39	≤ 30
Voluntary cull rate	%	***	10-20
Involuntary cull rate	%	***	≤ 15
Cow mortality	%	16	≤ 5
Cows left herd, 1-30 days in milk*	%		≤ 4
Cows left herd, 1-60 days in milk*	%		≤ 6

Table 5. Udder Health.

Parameter	Unit	Regional Average	Suggested Goal
Average SCC score	score	2.3	≤ 3.0
Weighted average actual SCC	cells/ml	237,000	≤ 200,000
1st lactation SCS, days 1-40	score	***	≤ 2.0
Cows culled for mastitis	%	***	≤ 3
Incidence of clinical mastitis (monthly)*	cases/100 cows		≤ 3

Table 6. Desirable Herd Distribution of Somatic Cell Scores.

Lactation	Somatic Cell Score			Average SCS
	0-3	4-5	6+	
1	> 80%	~ 20%	0%	≤ 2.5
2	> 70%	~ 25%	< 5%	≤ 2.8
3+	> 65%	~ 30%	< 5%	≤ 3.1
Total Herd	> 65%	~ 30%	< 5%	≤ 3.0

Table 7. Replacements.

Parameter	Unit	Regional Average	Suggested Goal
Average age at first calving	months	25.6	22-24
Calves dead at birth	%	***	≤ 5
Mortality, birth to 3 months*	%		≤ 5
Mortality, 3 months to calving*	%		≤ 2
Average daily gain*	lbs/day		1.6-1.8
Bodyweight at 1st breeding*	% mature BW		≥ 55
Average age at first breeding*	days		~ 420
Average age at first conception*	days		~ 450
Services per pregnancy*	number		≤ 1.8
Postcalving bodyweight*	% mature BW		≥ 82

Table 8. Miscellaneous.

Parameter	Unit	Regional Average	Suggested Goal
Average days dry	days	***	55-60
Dry periods < 40 days	%	9	0
Dry periods > 70 days	%	19	< 10
In milk on test day	%	85	85-88
Average days in milk	days	197	150-180

Data was obtained through DairyMetrics (DRMS) on August 12, 2024. Regional average includes data from VA, KY, MD, NC, TN, and WV herds with ≥ 25 cows.

* Information is not found on a Herd Summary DHI-202.

** Goal depends on the herd's production system.

*** Averages not available through DairyMetrics

Upcoming Events

September 27, 2024

[State Fair Junior Dairyman's Contest](#)

September 27-29, 2024

[VA State Fair Dairy Show](#)

October 21, 2024

[Hokie Cow Classic](#)

Blacksburg County Club

October 25, 2024

Inductions to the Livestock Hall of Fame
Blacksburg, VA

December 13-14, 2024

[VA WISE Cattle & Equipment Women Increasing Skills & Education](#)

Chatham, VA

If you are a person with a disability and require any auxiliary aids, services, or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.

Additional Notes:

The Virginia Department of Health (VDH) has made PPE supplies available to dairy producers at no charge to help reduce the risk of infection from Highly Pathogenic Avian Influenza (HPAI)/H5N1. The dairy extension group is working with VDH to assist in the distribution process. Request a kit online at <https://shorturl.at/ethov> or contact your local extension agent. Requests will be filled as supplies allow.

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