Is Your First Calf Feeding Good Enough?

Research from dairies across California and Colorado reveals what's really in colostrum — and what affects it

Scientists collected and tested colostrum from 20 dairies — both conventional and organic farms in California and Colorado. They measured colostrum quality and used DNA analysis to study the bacteria living in it. Here is what they found, and what it means for your operation.

FINDING 1 — Organic Farms Tend to Produce Richer Colostrum

What was measured and why it matters

Quality was tested using a Brix refractometer — a simple, inexpensive tool that measures how concentrated the colostrum is. Higher concentration means more antibodies, which means better protection for the calf against disease in its first weeks of life.

Organic farms scored significantly higher than conventional farms. This pattern was consistent across multiple farms, suggesting that management practices — not just luck — play a role. Differences in feed, cow health protocols, and housing between organic and conventional systems likely all contribute.

Brix scores: what they mean on your farm

- ✓ **≥22% Brix:** Good quality — feed to your first calf
- ✓ **18–21% Brix:** Fair — consider pooling with higher-quality colostrum
- ✓ **Below 18% Brix:** Poor — find a better batch for the first feeding

A digital Brix refractometer costs around $30–50 and the test takes 30 seconds. It is one of the most cost-effective management tools on any dairy.

FINDING 2 — Every Farm Has Its Own Microbial 'Fingerprint' in Its Colostrum

What the DNA analysis showed

Colostrum is not just antibodies — it also contains living bacteria that help seed the calf's gut. Researchers used DNA testing to identify the types of bacteria present in colostrum from each farm.

The results showed that individual farms differed considerably from one another. The farm itself — its environment, cows, and daily practices — is the main driver of what bacteria end up in the colostrum. There was no consistent overall difference in bacterial diversity between organic and conventional farms.

What this means in practice

- ✓ **Your farm has a unique microbial community** that gets passed directly to calves through colostrum
- ✓ **Good calving hygiene matters —** a dirty environment introduces the wrong bacteria at the most critical moment in a calf's life
- ✓ **Practices like clean calving areas and prompt colostrum delivery** make a real difference to the bacterial community a calf receives

Does freezing change the bacterial diversity?

No. Freezing did not significantly change the number or variety of bacteria types in colostrum. Fresh and frozen samples from the same farm had very similar microbial communities. Your farm's microbial fingerprint is preserved through freezing.

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★ What This Means for Your Farm

- ★ Test every colostrum batch with a Brix refractometer before the first feeding — it takes 30 seconds and can save a calf
- ★ Organic dairies in this study consistently produced higher-quality colostrum — consider the effects of your management practices
- ★ Your farm's daily environment shapes the bacteria in your colostrum more than anything else
- ★ Freezing does not significantly reduce microbial diversity in colostrum

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Does Freezing Colostrum Harm the Bacteria in It?

Two independent tests gave the same reassuring answer

Many producers freeze extra colostrum to have it available when needed. A common question is whether freezing damages or kills the beneficial bacteria. Researchers used two separate methods to answer this, and both pointed to the same conclusion.

FINDING 3 — Freezing Does Not Change the Types of Bacteria Present

How this was tested

Researchers used DNA analysis to identify all the bacteria in each colostrum sample, then compared the overall community — the full mix of bacteria — between fresh and frozen samples from the same farms.

Statistical analysis showed that fresh and frozen samples from the same farm were far more similar to each other than samples from different farms. In other words, freezing did not push the microbial community in a meaningfully different direction. The biggest differences were between farms, not between fresh and frozen colostrum.

The key finding, plain and simple

- ✓ **Your farm's microbial fingerprint is preserved through freezing —** the types of bacteria present do not change significantly
- ✓ **Farm management — not your freezer —** is the primary factor shaping what bacteria calves receive through colostrum
- ✓ **Organic and conventional farms had somewhat different microbial communities overall,** but freezing did not change this pattern

What about harmful bacteria?

A related study from this same research group found that Mycoplasma bovis — a pathogen that can cause serious respiratory and joint disease in calves — was not detected in fresh colostrum samples tested from California dairies. This is encouraging news for biosecurity, though continued testing across more farms is important.

FINDING 4 — The Number of Live Bacteria Is Also Not Significantly Changed by Freezing

What was counted, and when

Researchers counted live bacteria in colostrum at six time points: fresh (no freezing), and then at 24, 36, 48, 96, and 144 hours of freezing — that last point is six full days in the freezer.

Two independent counting methods were used: a traditional culture-based method (growing bacteria on plates) and a modern DNA-based PCR method. Both methods agreed: there were no significant differences in live bacterial counts across any of the time points.

What this means for your freezer

- ✓ **Freezing colostrum for up to 6 days does not appear to significantly reduce live bacterial counts**
- ✓ **Both the types of bacteria and how many are alive are largely preserved through freezing**
- ✓ **Storing colostrum frozen remains a sound management practice from a microbial standpoint**
- ✓ **Use clean, sealed containers and label with the date and Brix reading for best results**

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ALSO FROM THIS RESEARCH — Housing and Stress in Young Calves

The same research team tracked 84 calves from birth to 60 days of age on two dairies — one conventional in California and one organic in Colorado. They measured stress hormones from hair samples and checked whether immune protection varied with colostrum quality.

Better colostrum → stronger immune protection

Calves that received higher-quality colostrum (higher Brix) had significantly higher serum total protein at 3 days of age. Serum protein at day 3 is the standard on-farm indicator that a calf absorbed enough antibodies to be well-protected. This confirms: colostrum quality at birth directly predicts how well a calf's immune system is armed.

Group housing reduces chronic stress

Calves housed with other calves showed a significantly larger drop in stress hormones between day 1 and day 14 compared to calves housed alone. Hair cortisol — the hormone measured — reflects long-term chronic stress, not just a single bad moment. Both individually and group-housed calves improved over time, but group-housed calves improved more, suggesting that social contact helps calves cope with the challenges of early life.

The calf GI microbiome is established in the first 3 days — that window matters enormously

Researchers found that the bacterial community in a calf's GI tract grows rapidly in the first 3 days of life and then levels off and stabilizes. The bacteria that colonize first tend to stay. This means the very first feedings and the cleanliness of the calving environment have a disproportionate influence on the gut bacteria that calf will carry for the rest of its life. A clean calving pen, prompt colostrum delivery, and good-quality first milk are not just best practices — they are the foundation of long-term gut health.

★ What This Means for Your Farm

- ★ Freezing colostrum for up to 6 days does not significantly reduce the number or variety of bacteria in it — it remains a safe storage practice
- ★ Your farm environment is the main factor shaping the microbial community in your colostrum — not whether you freeze it
- ★ Always check colostrum quality with a Brix refractometer (≥22% = good) before the first calf feeding
- ★ Higher-quality colostrum directly translates to better immune protection for calves in the first days of life
- ★ Consider allowing calves to have social contact — group or pair housing measurably reduces chronic stress
- ★ The calf gut is colonized in the first 72 hours — a clean calving environment and prompt first feeding are critical

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