

# Technical Bulletin

Arm & Hammer Animal and Food Production



## CERTILLUS supported production and immune response in lactating cows.

### STUDY OVERVIEW

A comprehensive, field-based study<sup>1</sup> was conducted to evaluate the effect of feeding CERTILLUS™ on several key indicators including digestive health, ruminal bacterial populations, milk production, daily dry matter intake and milk production efficiency on over 2,200 lactating Holstein dairy cattle.

The analysis was conducted at a farm in New York state between August 8, 2020, and December 21, 2020, and monitored by Dairy Health & Management Services. A total of 2,302 cows were split into groups by lactation and average milk production and then randomly allocated to pens.

A randomized, controlled, pen trial design resulted in three pairs of pens: four early lactation pens for cows from 1 day in milk (DIM) until confirmed pregnant, and two late lactation pens with the same corresponding diet. This resulted in a total of 1,160 cows on the CERTILLUS diet and 1,142 cows on the control diet throughout the course of the study.

A mixed effects model fit to the daily milk yield results for DIM prior to DIM 160 was used to determine if CERTILLUS affected average cumulative milk yield for various durations in early lactation. The model included main fixed effects for lactation group (2, 3+), treatment (CERTILLUS, control), DIM, and fixed interaction effects for DIM with treatment and DIM within lactation group.

As a field-based study, statistical significance was declared at  $P < 0.10$ . When the probability was between 0.05 and 0.10, we stated the exact probability value. The following endpoints were collected during the study for analysis: individual cow daily milk yield, daily pen feed delivered and refused, health events and mortality, monthly dairy herd improvement (DHI) milk production and components, fecal total clostridia and *Clostridium perfringens*, and blood acute-phase protein (haptoglobin) and lipopolysaccharide binding protein (LBP).

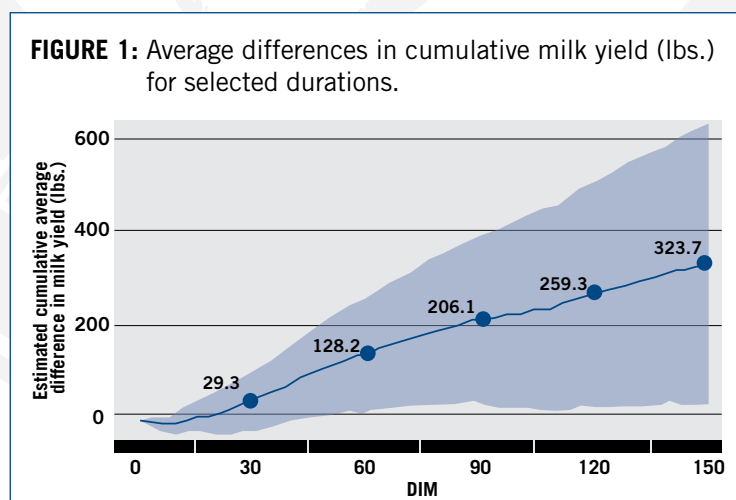
### RESULTS

#### Production Response

The difference between the CERTILLUS and control groups in average cumulative daily milk yield from day 1 through days 30, 60, 90, 120, and 150 was computed using contrasts. The estimated differences are presented numerically in Table 1 and graphically in Figure 1. Treatment effects or interactions of an additional 3.27 lbs. of energy-corrected-milk (ECM) yield per day were found to be moderately significant ( $P=0.071$ ).

Duration	(CERTILLUS-Control)	SE	P-Value
First 30 days	29.3	32.2	0.363
First 60 days	128.2	63.1	0.042
First 90 days	206.1	93.9	0.028
First 120 days	259.3	124.7	0.038
First 150 days	323.7	155.3	0.037

FIGURE 1: Average differences in cumulative milk yield (lbs.) for selected durations.



Milk components were not significantly affected by treatment; however, small numerical differences drove the ECM produced on test day for CERTILLUS™-fed cows to a greater extent than the daily milk volume results, as shown in Table 1.

### Risk Classification

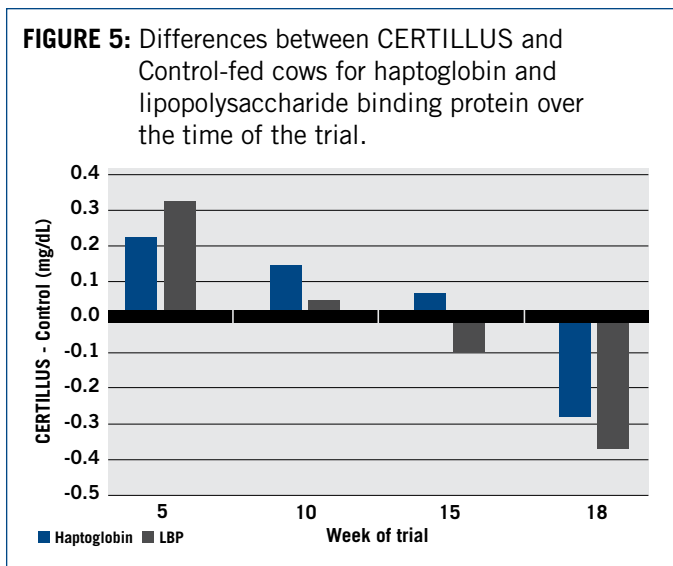
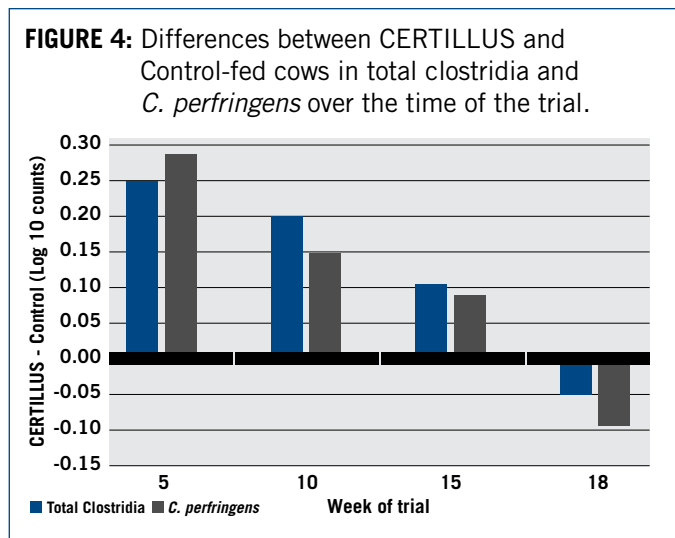
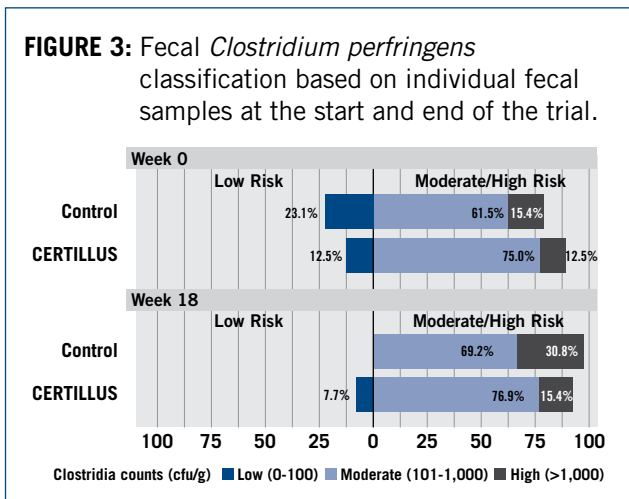
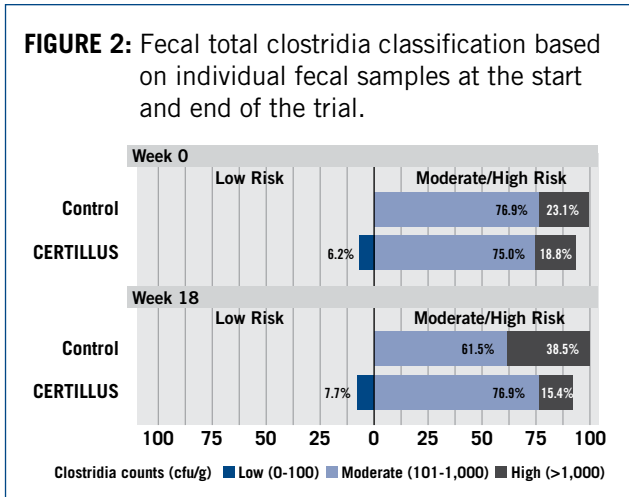
Over the 18 weeks, the proportion of cows in the low-risk category for total clostridia increased slightly for CERTILLUS-fed cows, and the proportion of cows in the high-risk category fell substantially. At the same time, the proportion of high-risk cattle increased for control cows. This indicates that the control cows may have experienced rumen fermentation challenges (Fig. 2).

The proportion of cows in the low-risk category for *Clostridium perfringens* decreased slightly for CERTILLUS-fed cows. However, there were no low-risk cows in the control group by week 18. The proportion of cows in the high-risk category increased for the control cows and there were no control cows in the low-risk category. The control cattle had twice as many high-risk cows over the 18 weeks. Thus, there may have been a greater potential for subclinical digestive disorders in that group as well (Fig. 3).

At the beginning of the trial, CERTILLUS-fed animals had more total clostridia and *C. perfringens* than the control group. By the end of the trial the situation was reversed; CERTILLUS-fed cows had less clostridia in fecal samples than control cows (Fig. 4).

### Immune Markers

Figure 5 shows the change over time in the acute phase proteins lipopolysaccharide binding protein (LBP) and haptoglobin. While neither haptoglobin nor LBP were at levels to cause concern of clinical disease in this trial, the CERTILLUS-fed cows began the trial with higher levels than the control cows, but over time, the markers were reduced to the point that by the end of the trial, CERTILLUS-fed cows showed lower levels of these inflammatory markers than control cows.



## CONCLUSION

In this study, statistically significant data demonstrated that CERTILLUS-fed cows had higher milk yield, greater ECM, less clostridia and *Clostridium perfringens*, and lower inflammatory markers. Specifically:

- Cumulative daily milk yield from the CERTILLUS group increased significantly between 30 and 60 days on treatment ( $P<0.05$ ) and remained throughout the trial.
- Energy-Corrected Milk (ECM) yield from monthly DHI testing was significantly higher (+ 3.27 lbs. per day) for cows in the CERTILLUS group ( $P<0.10$ ).
- Fecal samples for total clostridia and *Clostridium perfringens* trended to decline with CERTILLUS treatment duration resulting in a shift in microbial diversity and lower risk.



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To learn more about CERTILLUS contact your nutritionist, veterinarian or ARM & HAMMER™ representative or visit [AHfoodchain.com](http://AHfoodchain.com).

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