

# Relationships of Rump with Fertility & Calving Performance

The dairy cattle breeding world has long promoted the importance of structurally sound rumps. Proper rump conformation has been touted as a promoter of fertility and calving ease. In this article we take a closer look at these relationships as well as genetic selection to improve them.

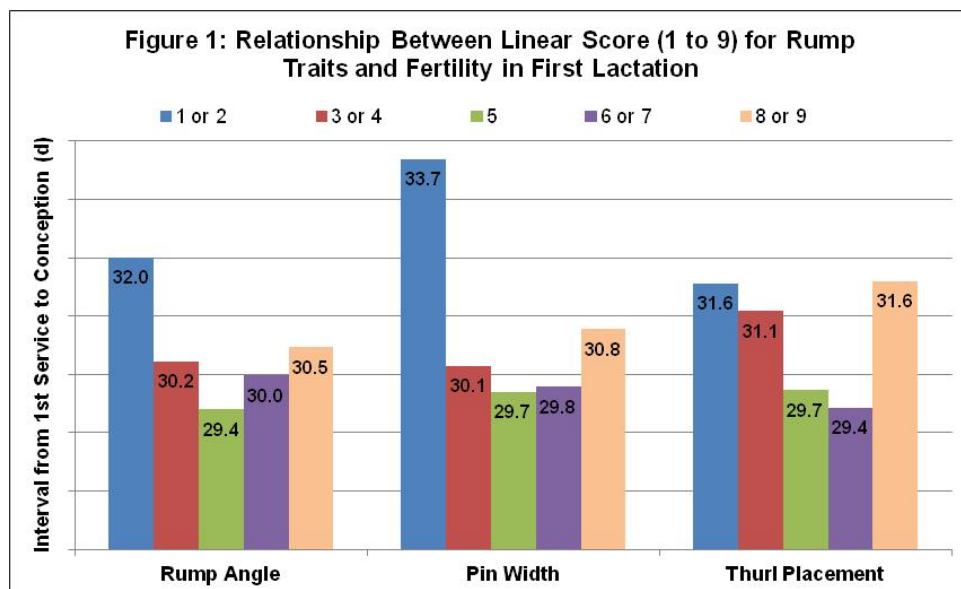
## The Impact of Rump - Cow Level

At Canadian Dairy Network (CDN), we used recent classification, calving and breeding data in for over 60,000 first lactation Holsteins to quantify any phenotypic relationships that may exist between rump conformation with measures of calving performance and fertility. Rump conformation is assessed on a linear scale from 1 to 9 for Rump Angle, Pin Width, Loin Strength and Thurl Placement, which are combined into an overall score for Rump. Calving performance is measured both as calving ease and calf survival, which is the opposite of stillbirth rate. Measures of each cow's fertility include the interval from calving to first service/insemination and the subsequent interval from first service to conception, with the sum of these together equalling days open.

Results of the analysis at the cow level indicate that some relationships exist between classification scores for rump traits and performance at first calving:

- Very low pins (Rump Angle of 8 or 9) are associated with 2% easier calvings compared to cows with very high pins (Rump Angle 1 or 2)
- Thurls too far back (scores of 1 or 2) are associated with nearly 3% more difficult calvings compared to other linear scores
- The rate of calf survival is 5% higher for cows with very strong loins (scores of 8 or 9) compared to very weak loins (scores of 1 or 2)
- Calf survival is 3% higher for cows with very low pins (Rump Angle of 8 or 9) compared to very high pins (Rump Angle of 1 or 2)

Although very little relationship was found between rump conformation and the interval from calving to first service, Figure 1 shows the significant association found between Rump Angle, Pin Width and Thurl Placement on the cow's fertility when measured as the interval from first service to conception.



For Pin Width, it is clear to see that cows with very narrow pins (linear scores of 1 or 2) have conception delayed by 4 days compared to cows with pins assessed with a score of 5. Cows with very wide pins in this analysis also showed a delay in conception of one day.

The Canadian classification system for Rump Angle and Thurl Placement considers these traits as having an intermediate optimum. Cows with a linear score of 5 or 6 for Rump Angle are deemed ideal and a score of 6 is ideal for Thurl Placement. Figure 1 clearly supports this concept of intermediate optimum for both these traits since cows with linear scores at either extreme demonstrated poor conception rates. For Rump Angle, cows with very high pins had conception delayed by nearly 3 days compared to cows with a linear score of 5 and cows with very low pins also experienced a delay of one day. For Thurl Placement, cows scored at either extreme of the linear scale had conception delayed by an average of 2 days compared to those with the ideal score of 6.

### The Impact of Rump - Sire Level

As mentioned earlier, type classification data for the four descriptive traits are combined to assign each cow an overall Rump score. This score is used to calculate sire proofs for Rump, which is the primary tool for genetic selection to improve rump conformation. Table 1 shows proof correlations between Rump and selected key traits derived using data from 4,100 domestically proven Holstein bulls. Positive correlations above 10% are identified in green while negative correlations below 10% are labeled in red.

Table 1: Proof Correlations Between Rump and Selected Key Traits	
Trait	Correlation with Rump
Calving Ability	-0.15
Daughter Calving Ability	0.08
Daughter Fertility	-0.03
Herd Life	0.13
LPI	0.17
Pro\$	0.17

From these results, we can draw the following conclusions:

- The negative correlation with Calving Ability indicates that sires with high Rump proofs tend to produce calves that have greater difficulty being born and/or surviving.
- Daughter Calving Ability and Daughter Fertility are genetically unrelated to Rump in terms of sire selection, meaning that selection for Rump will not translate into genetic progress for these functional traits.
- The positive correlation between Rump and Herd Life indicates sire selection can improve both of these traits at the same time.
- Rump is positively correlated with both LPI and Pro\$ so selection for either of these national indexes will result in genetic progress for Rump at the same time.

The positive correlation between Rump and LPI is of particular interest since Rump is not a trait that is directly included in the Holstein LPI formula. The genetic relationship between Rump with other traits in the LPI formula already translates to genetic gain for Rump. While it is useful to record individual rump traits and monitor breed trends over time, direct inclusion of Rump in the LPI formula is unnecessary since ample improvement can be made by using either national index as a primary selection tool. As a herd management tool, the Canadian classification system for rump traits aims to identify cows that will have better fertility and calving performance.

If improving rumps are important to you, either on a herd or individual cow basis, selection for rump traits will help you achieve your goals. If improving fertility and calving performance is important to you, good management combined with selection directly for the Daughter Fertility, Daughter Calving Ability and Calving Ability will get you there.

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