

CALVING EASE

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When to Test for Immunity

- **Protection against infections among young calves is directly related to antibody levels in their blood.**
- **Using serum from a blood sample we can estimate circulating antibody levels in young calves.**
- **A practical schedule for taking blood samples often includes drawing blood on calves between 1 and 7 days of age.**
- **Research continues to show that while antibody levels are a significant factor in calf wellbeing we also need to do a good job in reducing pathogen exposure and feeding plenty of clean, wholesome milk/milk replacer.**

Have you ever heard of the 5 Q's of colostrum management?

- **Quickly** – feed colostrum as soon as possible after birth.
- **Quantity** – feed colostrum at the rate of 10 percent of body weight.
- **Quality** – for the first feeding use the best quality of colostrum available
- **Quantify** – **check blood antibody levels on young calves regularly.**
- **sQueaky clean** – follow practices that deliver colostrum with low bacteria counts.

Quantify Immune Protection against Infections

A guide to testing for immunity among young calves can be accessed at: www.calfacts.com. Click on “Transfer of Immunity: How to test for.” This guide explains how to use blood serum from calves to get values for “Blood Serum Total Protein” or BSTP. This guide suggests that the most valid blood serum total protein values come from samples that are taken when the calves are between 1 and 3 days old. It is recommended to take blood samples no later than 7 days of age.

Research has shown that either gravity over 24 hours or a laboratory centrifuge will work equally well in separating serum from blood cells. You will get over 95 percent agreement in values of BSTP between the methods.

A clinical refractometer is needed. Either a manual or digital models give the same results. Expect over 95 percent agreement in values.

What does research have to say about when to test for immunity?

First, what support is there for the connection between blood serum total protein (BSTP) and the antibodies circulating in a calf's blood (serum immunoglobulins)? A study used blood from 457 calves from 12 farms to answer this question. They found that using blood serum collected between 1 and 8 days that 80 percent of the variation in antibody levels was explained by the level of BSTP. Another study using blood collected on day 4 reported the same relationship at 84 percent. Many of us working with calves feel this relationship is strong enough to make BSTP a reasonable on-farm procedure to estimate immunity levels for groups of calves.

Second, how valid are the BSTP values collected at different ages? Study results do show that the most rapid rates of antibody absorption take place three to twelve hours after the first colostrum feeding. Research indicates that when tube-fed calves are compared to bottle-fed calves the peak values may be around 3 hours later. Nevertheless, most studies suggest one must wait at least until the calf is 24 hours old for blood sampling in order to capture peak BSTP values.

The few studies that have multiple blood sampling show less than 10 percent variation among values among samples from 24, 48 and 72 hours of age. Beyond three days old the study results tend to vary. One study done in Germany shows BSTP values being quite stable out to 7 days but dropping significantly by 14 days.

The research we need is to measure both BSTP and antibody levels daily for a week. Results from one study suggest that it might be possible that the actual antibody (immunoglobulin G) concentration may decrease slightly over the period of 7 days in spite of BSTP remaining stable.

Bottom Line

Should you be concerned about your blood serum total protein values depending on the age of the calves when the blood samples were taken? Well, it depends. If, on one hand, 90 percent of your values are already at 5.5 or above don't sweat the small stuff – continue your current sampling practices. If, on the other hand, 20 percent or more of your values are below 5.0 you may want to make an effort to collect the next 12 or 15 samples in the 1 to 3 day range just to be more certain you have valid values.

References: Kaske, M., A. Werner, H.J. Schubereth, J. Rehage and W. Kehler, "Colostrum management in calves: effects of drenching vs. bottle feeding." *Journal of Animal Physiology and Animal Nutrition*, 89:151-157 (2005). Nocek, J.E., D.G. Braund and R.G. Warner "Influence of neonatal colostrum administration, immunoglobulin, and continued feeding of colostrum on calf gain, health and serum protein." *Journal of Dairy Science* 67:319-333 (1984). Sato, T., and Others, "Effect of difructose anhydride III on serum immunoglobulin G concentration in newborn calves." *Journal of Dairy Science* 95:5336-5339 (2012). Swan, H., S. Godden, R. Bey, S. Wells, J. Fetrow and H. Chester-Jones "Passive transfer of immunoglobulin G and preweaning health in Holstein calves fed a commercial colostrum replacer." *Journal of Dairy Science* 90:3857-3866 (2007). Wallace, M. M., B.D. Jarvie, N. R. Perkins and K. E. Leslie "A comparison of serum harvesting methods and type of refractometer for determining total solids to estimate failure of passive transfer in calves." *Canadian Veterinary Journal* 47:573-575 (2006).

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