

Effect of Adding SUCCEED™ to the Diet of Pregnant Mares 90 Days Pre-Foaling

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Overview: SUCCEED™ Digestive Conditioning Program™, a nutritional supplement for horses, contains ingredients believed to help support the immune system. The period prior to and during foaling is particularly challenging for horses. A challenged immune system can mean a reduction in immunity transferred to the foal. This may leave both the mare and foal more susceptible to disease.

The purpose of this experiment was to measure the effect on immunity of 26 Thoroughbred mares in the state of Kentucky when SUCCEED was added to the diet 90 days prior to foaling. Colostrum IgG levels are correlated to blood IgG levels in mares and thus are a good measurement of mare immune status. A high colostrum IgG level is also critical for the success of passive transfer of immunity to foals, and thus can be a good predictive indicator for foal immunity. To determine the effect of SUCCEED on Mare colostrum, samples were obtained and analyzed for IgG using standard methods by a large equine veterinary clinic in Lexington, Kentucky.

Methods: 26 Thoroughbred mares on three breeding farms in central Kentucky were randomized into two groups of 13; SUCCEED (1 ounce/head/day as paste) and Control (did not receive product). All mares were between 3 and 13 years of age, were fed similar diets (pasture and feed), and had similar vaccination protocols. Colostrum samples were taken within one hour post foaling and analyzed by radial immunodiffusion assay (RID) at a large equine veterinary clinic in central Kentucky. Differences in population means were analyzed for significance using the Student T test.

Results: Mares on SUCCEED had a significant ($p=0.02$) 97% improvement in colostrum IgG values as compared to mares not on SUCCEED. For the mares on SUCCEED, colostrum IgG values averaged 14038 mg/dl, while the negative control averaged 7078 mg/dl. All mares in the study received adequate nutrition, were of good health, and foaled normally. Colostrum IgG values for the negative control group are considered in the average range for horses of 7000mg/dl.

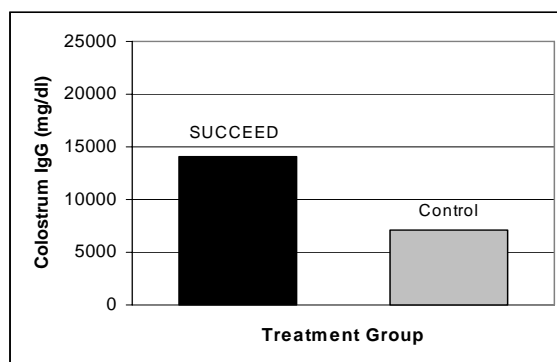


Figure 1. Average of colostrum IgG levels among mares fed SUCCEED™ for 90 days vs. a control group.

Discussion: Foals are born without immunity, and the only way to obtain antibodies is from Mare's colostrum (Jeffcott 1974). The transfer of immunoglobins (IgG) from the mare to the foal within the first 12-24 hours post-foaling is critical for good foal immunity and early health.

Colostrum is the vehicle that carries these immunoglobins, and colostrum quality is dependant on the immune status of the mare. An immune system functioning at optimum capacity is essential for the mare in order to produce a healthy and viable foal (Spearman 2004). Research supports that a mare with a healthy immune system will produce high quality colostrum, and that colostrum quality or immunoglobulin content is highly correlated to both mare serum immunoglobulin levels (Curadi 2001) and to foal serum immunoglobulin levels (LeBlanc 1992). However, there are many factors that can negatively influence the production of IgGs by a mare and result in poor colostrum quality including: age (Pearson 1984, LeBlanc 1992), breed (Pearson 1984), and disease. Therefore it is critical to correct these issues and support the mare's immune system to ensure she has as optimal immunity as possible.

Failure of passive transfer (FPT) or partial failure of passive transfer (PFPT) is the result of a foal not transferring antibodies from colostrum into its own serum. FPT and PFPT are strongly related to time of colostrum ingestion, prelactation of colostrum by the mare and, most importantly, colostrum immunoglobulin

content (McGuire 1977, LeBlanc 1992). FPT and PFPT most often result in compromised immunity throughout the life of the foal. Additionally, in other species FPT and PFPT relates to an average 20% decrease in growth rates and body weights at 200 days. While this information is yet to be investigated in horses, one would expect a similar result. To correct FPT, often poor quality colostrum is supplemented with high quality colostrum from a colostrum bank, by oral supplement of purified equine IgGs, or by IV administration of serum. However, the most efficient and effective method for delivering IgGs to the foal is to ensure the mare's own ability to produce them.

Research has shown that feeding good quality colostrum can enhance the foal's immune health over its lifetime (Sellon 2000, Raidal 1996, McGuire 1977, Tyler-McGowan 1997). As a result, influencing colostrum quality through nutrition of the mare has been an area of much interest.

Research has indicated that certain nutritional approaches can have an influence on colostrum quality. Mannan Oligosaccharides (Spearman 2004), certain beta-glucans (Krakowski 1999), and vitamin E (Cipriano 1982), have all been shown to give small increases in colostrum immunoglobulins in a nutritionally adequate background. Additionally, protein, energy, vitamins and minerals have all been shown to improve colostrum quality, but only in contrast with diets deficient in these nutrients, a problem we did not have in this study. To maximize colostrum quality, maintaining good immunity apparently needs to be approached from many angles.

As previous research has indicated, there are a number of nutritional approaches to improving immunity in the horse, but each of these approaches individually has limited utility. While any one ingredient can have an effect on immunity and colostrum quality, their effect is often limited and increasing the level of that nutrient in the diet can often be detrimental. Immune stimulatory compounds can be over fed, vitamins and minerals that enhance immunity can also interfere with uptake of other essential nutrients, and overfeeding an immune supporting compound may have no affect over a certain level, resulting in wasted money. Finally, many of these functional ingredients are very dependant on their source and method of preparation to ensure biological activity. If the active compound is not well understood and poorly quality controlled, one may have no benefit from feeding a given batch of that product.

The results in this trial indicate that a multifactorial approach to influencing mare immunity through nutrition can give much better results than any single ingredient alone. To maximize mare, and thus foal, immunity an approach that considers the health and function of the entire equine digestive tract and that provides a variety of functional ingredients to

support good immunity is needed. SUCCEED, through the careful selection of functional ingredients to work in synergy, accomplishes this goal.

While foal immunity was not measured in this trial, based on previous research indicating the high correlation between foal serum immunoglobulins and mare colostral immunoglobulins, one would expect that these foals would have seen a dramatic increase in serum immunoglobulins. In turn, one would expect good short and long term health and immunity for these foals.

The implications of this research are broad and indicate a benefit for SUCCEED in any breeding application to support good mare immunity that subsequently benefits the foal. Based on the research in this study, SUCCEED should be recommended for any breeding operation concerned about optimal mare immunity and foal quality, particularly where the immune systems of the mares is particularly challenged, for older mares, and for mares or breeds with lower colostrum quality on average.

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