



Research Report

Introduction

The calf undergoes fundamental changes in the way it digests, absorbs and metabolizes nutrients during the first two months of life. Prior to weaning, the calf receives primarily a high protein, high fat and low fiber milk-based diet. After weaning, the calf must utilize nutrients derived exclusively from low fat, lower protein and higher fiber diets based on cereal grains, by-products and some forage. This transition from monogastric digestion of milk to ruminant fermentation and digestion of starter and forage is a significant challenge and many calves do not transition optimally. Researchers at the Nurture Research Center developed techniques to improve three discrete aspects of the calf's transition –metabolism, digestion, and absorption.

Metabolism

The way absorbed nutrients are utilized by the body for various functions, including growth is referred to as *metabolism*. Preweaned calves use nutrients differently from older calves and adult cattle, mainly because the source of nutrients is profoundly different before weaning. During the weaning transition (as calves consume more grain-based feeds), the body must adapt to increasing availability of volatile fatty acids and decreasing availability of glucose from milk. Activities of important enzymes change in the liver, muscle and other tissues adapt to changing availability of substrate.

Nurture Research scientists' evaluated methods to improve how calves metabolize nutrients. Results of research trials conducting using a novel "factor" (called "M" Factor) was shown to improve growth and feed efficiency of calves when fed in milk replacer (0 to 8 weeks), calf starter (0 to 8 weeks) and calf grower (8 to 16 weeks) studies (Table 1). Improved metabolism (i.e., utilization of ingested nutrients) was responsible for increased growth and feed efficiency observed in these studies.

Table 1. Research with M Factor			
Item	Control	M Factor	P value
Milk replacer research			
ADG, lb/day	1.08	1.16	0.03
Feed efficiency, gain/feed	0.405	0.423	0.05
Starter research			
ADG, lb/day	1.12	1.25	0.04
Hip width change, in	1.5	1.6	0.04
Grower research			
ADG, lb/day	2.09	2.38	0.01
Hip width change, in	2.0	2.3	0.04

Digestion

Digestion of starch and fiber requires increased secretion of enzymes from the stomach, intestine and pancreas, as well as development of ruminal fermentative capacity. We discovered a unique factor (called "D" factor) that improves digestion of nutrients by the young calf. Improved digestion releases more nutrients, and, thus can improve ADG and growth. Table 2 shows results of calf studies that document increased performance of calves fed "D" factor. This research was done with different types of fiber sources and in combination with "M" factor.

Table 2. Research with D and M Factors in Grower Feeds						
Factor	--	D	M	D,M	P value	
					D	M
ADG, lb/d	2.31	2.38	2.49	2.62	0.03	0.01
Hip width change, in	2.1	2.2	2.3	2.4	0.16	0.02

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Absorption

Nutrients digested in the gastrointestinal tract must be *absorbed* by the gastrointestinal tract to be utilized by the body. Development of the intestinal villi depends on the diet and newly discovered factors (“A” factor) enhance absorption and nutrient availability by the calf. The result is improved growth on the same diet. Research with A Factor also found increased glucose transporter activity and improved uptake of glucose. Performance of calves was improved when “A” Factor was fed. Performance of “A” Factor is additive with “M and D” Factors (Table 3).

Table 3. M, D, and A Factors

Factor	--	A	M,D	A,M,D	P value	
					M,D	A
Milk Replacer and Starter						
ADG, lb/d	1.11	1.21	1.2	1.31	0.05	0.03
Feed efficiency, gain/feed	0.435	0.449	0.460	0.468	0.08	0.09
Hip width change, in	1.7	1.8	1.8	2.0	0.05	0.06
Grower						
ADG, lb/d	2.11	2.18	2.22	2.33	0.01	0.05
Feed efficiency, gain/feed	0.320	0.326	0.348	0.330	0.05	0.46
Hip width change, in	1.9	2.0	2.1	2.1	0.03	0.73

NeoTec4

NeoTec4 is an additive for calf milk replacer, starters and growers that provides specific fatty acids missing in the typical diet of the calf. These fatty acids are involved in gut development and immune system activity. Numerous published research trials have demonstrated how NeoTec4 increased ADG when fed via the milk replacer (4, 6, and 8 week-weaning), starter (0 to 8 weeks), or grower (8 to 12, or 8 to 16 weeks). In most milk replacer trials (when scours are most prevalent), scouring is typically reduced when NeoTec4 is fed. Similarly, growth, feed efficiency and frame size are improved when NeoTec4 is included in the starter and grower*.

NeoTec5g

NeoTec5g is the combination of NeoTec4 and the three nutritional factors “A, M, and D”. The resulting product, called NeoTec5g, provided highly functional nutrients and improves performance of calves in the milk feeding, starter and grower phases of life. NeoTec5g is available in calf milk replacers and as a supplement to milk replacers, calf starters and growers.

*References from Expert (Peer) Reviewed Journals

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