

## Research findings

Work done at the Nurture Research Center has contributed significantly to the scientific community and our understanding of calf nutrition and management. Below is a list of some of the many discoveries made at the facility.

- Amino acid requirements of neonatal calf
- Fatty acid requirements calves < 5 months old
- Crude protein requirements of calves < 5 months old
- Energy requirements of calves < 5 months old
- Feeding rates of milk replacer and feeding programs
- Digestive and immune system maturation
- Crude protein and carbohydrate sources for dry feeds
- Feeding and management for heat and cold stress
- Alternative proteins for milk replacer
- Housing management
- Use of feed additives



## Peer-reviewed contributions

Nurture Research Center research is published in the Journal of Dairy Science and the Professional Animal Scientist Journal.

Notable publications include research on the amino acid requirements for calves less than 5 weeks of age and the responses to key and essential fatty acids in calves less than 16 weeks of age. Both areas are "firsts" in the field of calf nutrition and are gaining the attention of calf researchers and calf nutritionists worldwide.

### Selected publications

- Feeding calves different rates and protein concentrations of twenty percent fat milk replacers on growth during the neonatal period – Prof. Anim. Sci. 22:252-260 (2006)
- Feeding rate and concentrations of protein and fat of milk replacers fed to neonatal calves – Prof. Anim. Sci. 23:374-381 (2006)
- Protein concentrations for starters fed to transported neonatal calves – Prof. Anim. Sci. 23:123-134 (2007)
- Effects of changing the fat and fatty acid composition of milk replacers fed to neonatal calves – Prof. Anim. Sci. 23:135-143 (2007)
- Amino acid fatty acid and fat sources for calf milk replacers – Prof. Anim. Sci. 23:401-408 (2007)
- Apex plant botanicals for neonatal calf milk replacers and starters – Prof. Anim. Sci. 23:521-526 (2007)
- Effects of the feeding rate of high protein calf milk replacers – Prof. Anim. Sci. 23:649-655 (2007)
- Effects of feeding rate of milk replacers and bedding material for calves in a cold naturally ventilated nursery – Prof. Anim. Sci. 23:656-664 (2007)
- Effects of changing the fatty acid composition of calf starters – Prof. Anim. Sci. 23:665-671 (2007)
- Optimal concentrations of lysine methionine and threonine in milk replacers for calves less than five weeks of age – J. Dairy Sci. 91:2433-2442 (2008)
- Effects of the amount of chopped hay or cottonseed hulls in a textured calf starter on young calf performance – J. Dairy Sci. 91:2684-2693 (2008)
- Effects of feeding different carbohydrate sources and amounts to young calves – J. Dairy Sci. 91:3128-3137 (2008)
- Oligosaccharides for dairy calves – Prof. Anim. Sci. 24:460-464 (2008)
- Effects of using wheat gluten and rice protein concentrate in dairy calf milk replacers – Prof. Anim. Sci. 24:465-472 (2008)
- Crude protein for diets fed to weaned dairy calves – Prof. Anim. Sci. 24:596-603 (2008)
- Effect of consistency of nutrient intake from milk and milk replacer on dairy calf performance – Prof. Anim. Sci. 25:85-92 (2009)
- Effects of changing the essential and functional fatty acid intake of dairy calves – J. Dairy Sci. 92:670-676 (2009)
- Effects of corn processing particle size and diet form on performance of calves in bedded pens – J. Dairy Sci. 92:782-789 (2009)
- Roughage for diets fed to weaned dairy calves – Prof. Anim. Sci. 25:283-288 (2009)
- Optimizing nutrient ratios in milk replacers for calves less than five weeks of age – J. Dairy Sci. 92:3281-3291 (2009)
- Selenium yeast for dairy calf feeds – Animal Feed Science and Technology 153:228-235 (2009)
- Effects of fat concentration of a high protein milk replacer on calf performance – J. Dairy Sci. 92:5147-5153 (2009)
- Effect of weaning age of dairy calves fed a conventional or more optimum milk replacer program – Prof. Anim. Sci. 25:619-624 (2009)
- Effect of yeast culture, fatty acids, whey, and a peptide source on dairy calf performance – Prof. Anim. Sci. 25:794-800 (2009)
- Effect of milk replacer program on digestion of nutrients in dairy calves – J. Dairy Sci. 93:1105-1115 (2010)
- Roughage amount, source, and processing for diets fed to weaned dairy calves – Prof. Anim. Sci. 26:181-187 (2010)
- Effects of including corn distillers dried grains with solubles in dairy calf feeds – J. Dairy Sci. 94:3037-3044 (2011)
- Comparisons of housing, bedding, and cooling options for dairy calves – J. Dairy Sci. 94:2138-2146 (2011)
- Impact of various fatty acids on dairy calf performance - Prof. Anim. Sci. 27:167-175 (2011)
- Fatty acid intake alters growth and immunity of milk-fed calves – J. Dairy Sci. 94:3936-3948 (2011)
- Effect of high and low cereal grain starter on straw intake and rumen development of neonatal Holstein calves – Prof. Anim. Sci. 27:357-364 (2011)
- Effects of adding arginine and histidine to dairy calf milk replacers - Prof. Anim. Sci. 27:565-570 (2011)
- Meta-analysis of the impact of initial serum protein concentration and empirical prediction model for growth of neonatal Holstein calves through eight weeks of age – J. Dairy Sci. 95:363-369 (2012)
- Effect of feeding rate and weaning age of calves fed a conventional milk replacer during warm summer months - Prof. Anim. Sci. 28:135-140 (2012)
- High starch coarse grain low fiber starters maximize growth of weaned dairy calves less than 4 months of age - Prof. Anim. Sci. 28:325-331 (2012)
- Methods of reducing milk replacer to prepare dairy calves for weaning when large amounts of milk replacer have been fed - Prof. Anim. Sci. 28:332-337 (2012)

## Technology Overview

Results of research trials at the Nurture Research Center have been used to develop milk replacers, starters, and grower feeds that are unique to the industry. Here are some of the technologies available to calf raisers.

**NeoTec4**  
...for calf performance and profit

NeoTec4 provides essential fatty acids which are deficient in milk, milk replacer, starter and growers. These functional fatty acids generally support the immune system and promote healthy body weight gain, structural growth, and feed efficiency.

**NeoTec5**  
...for calf performance and profit

NeoTec5g provides all of the benefits of NeoTec4 and more. We have added three factors that have been research proven to support healthy digestion, metabolism and absorption.

**AmNeo**  
Creating more calf  
Research proven amino acid balance.

AmNeo is our amino acid balancing technology. Research has also found that several essential amino acids are deficient in milk and milk replacer, by supplementing these specific nutrients we are able to promote healthy calf performance and feed efficiency.

**Complement**  
Synthesizing growth

Complement is a milk derived functional ingredient that supports healthy immune function post gut closure.



Developing a thorough understanding of calf nutrition and management



## Industry-leading research

The Nurture Research Center is a state of the art calf research facility dedicated to furthering our understanding of calf management and nutrition.



**NURTURE  
RESEARCH  
CENTER**

**20+**

20+ trials per year

**50**

50 calves arrive every 5 weeks

**200**

200-head one-time capacity

**40+**

40+ peer-reviewed publications

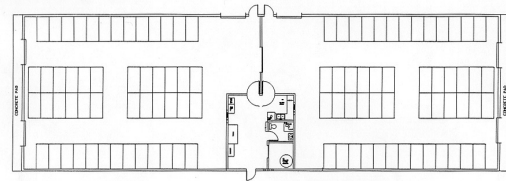
Built in 1999, work done at the Nurture Research Center facility has contributed to more peer-reviewed calf publications than at any other commercial, university or government facility.

## Facility overview

Research at the Nurture Research Center is focused on two stages of development. Pre-weaning research is conducted in the Nursery, while post-weaned calves are studied in the Grower unit.

### Nursery Unit (0-8 weeks)

- 2 rooms, 50 pens in each
- Natural ventilation with curtain sides
- Clear polycarbonate roof and retractable shade cloth
- 4' x 8' pens with deep straw bedding
- Calves are fed and weighed individually

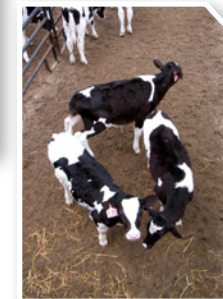


**NURTURE  
RESEARCH  
CENTER**



### Grower Unit (8-16 weeks)

- 24 pens
- Groups of 4-5 calves
- Housed in a super hutches
- Fed and weighed as a group



### Data Collection Every Trial

- Temperature/humidity (hourly)
- Feed offered and refused (daily)
- Fecal score (daily)
- Medical treatments (daily)
- Calf weight (weekly)
- Body condition score (biweekly)
- Hip width (biweekly)
- Hip height, Heart girth and Paunch girth (beginning and end)



### Data Collection

*As dictated by the procedure*

- Digestibility
- Markers of immunity (serum IgG, tumor necrosis factor and various interleukins)
- Blood constituents (glucose, urea nitrogen, BHBA, etc.)
- Intensive measurements of body temperature and posture