

Designing, Building, and Maintaining a Commercial Calf and Heifer Research Facility

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In the fall of 2002, a budget shortfall necessitated changes in dairy facilities and a redefining of research and educational programs. A decision was made to close the lactating dairy facility at the Southern Research and Outreach Center (SROC), Waseca. As part of the redirection and focusing of efforts, dairy faculty in the Department of Animal Science identified 3 areas which they felt were important areas for the dairy industry and the University of Minnesota could make productive and important contributions to in the next 5 years. These areas were: Youngstock – growth and nutrient requirements; Dairy Cow Genetics and Genomics; and Reproductive Management.

The closing of the lactating facility at the SROC offered a new opportunity to develop new young stock facilities to support an effective research and extension program in this area. Early in 2003 an industry partner, Ridley Inc. or locally known as Hubbard Feeds, and a commercial dairy supported the Youngstock program redirection with an emphasis on calf raising from 2 to 200 days of-age. To be economically viable and provide for an optimal number of calves to support an effective research program, 700 contracted raised heifer calves per year would be needed.

The location and design of the new facilities were finalized in the summer of 2003. A 10-acre plot at SROC was selected for building on. The local feedlot ordinance was completed with a site visit and the building project was initiated in October 2003. A summary of building designs and research program needs is as follows:

Nursery Phase – Calves from 1 to 70 days of age; two 30' x 200' steel frame barns with 6' curtain side walls; two sections per barn with a central mixing/feed area between the two sections; 160 individual calf stalls with 40 stalls per section managed as all-in, all-out; individual pens (28 sq ft) in each section with removable panel dividers for post-weaning grouping. Individual feeding and performance record; up to 4 treatments per study or 25 calves per treatment randomized by weight and source

Grower Phase – 70-200 days of age; 2 barns: New 65' x 150' grower barn with curtain side walls, center feed alley and animal handling/treatment area. Existing 80' x 160' pole barn; 16 pens; 6 to 8 calves per pen. Each study could accommodate 3 to 4 treatments.

Once the building designs and program area was decided on, a source of heifer calves was sought. Contracts were developed and signed with three commercial dairies for raising their heifer calves which included fee structure, health and growth guarantees and understanding that calves would be used in nutrition and management research studies.

General Details and Specifications of Barns and Stalls

Calf Barns – Two wood post frame metal structures 30' x 200' long. Side walls are 6' high and constructed with 6" x 8" x 12' pressure treated posts. Rafters are clear span style to provide maximum clearance, such as those manufactured by Starwood Rafters or equal. Rafters have a

4/12 pitch. Barns have 2" fiberglass condensation blanket with white vinyl facing between roof steel and perlines as a condensation barrier. Six ridge vents, 4' long, installed in each barn. Each barn section has a concrete aisle 12' wide by 90' long. Center of barn feed mixing area is 20' wide by 30' concrete slab, heated with hot and cold water. End doors are metal roll up style, 6 per barn, 3 on each end, with the center doors being 10' x 10' and the outside doors being 8' x 8'. Each barn has one 7' x 9' insulated overhead door located in the middle of the barn going to the feed mixing area. The wall of each barn has 4 roll up curtain assemblies 6' by approximately 90' in length. Curtain material is white vinyl (13 oz) with gear roll up mechanism.

Calf Stalls – 48" wide and 96" long. Front of the stalls face a central alley. Each calf stall has 2 solid side panels with a minimum height of 48" and length of 96"; material for panels is ½" densilite or 2" PVC plastic planking for ease in washing and disinfecting between groups of calves; stall fronts are an open hot-dipped galvanized metal frame with a central rectangular opening (minimum of 7" x 12") for the calf to have access to two pail holders which are a minimum of 5" apart. Pail holders hold a 10 quart pail. Stalls are designed for easy removal (sliding) of divider panels while calves are in the stalls to allow for combining calves into small groups prior to moving to the grower barn. Solid side panels are secured between double hot-dipped galvanized front posts. The front posts are lagged into the concrete curb of the central alley and the posts are freestanding with an 8" x 8" plate mounted on the bottom for breakdown and removal during cleaning. The back panels (48" height, by 48" wide) can be either solid or wire to facilitate or reduce air flow during changing seasons. Back panels are secured to the rear posts using a latch or pin easy removal.

Grower Barn – Wood post frame metal structure 65' x 150' with 10' side walls constructed with 6" x 8" x 14' pressure treated posts. Posts are set 4' below grade in concrete and on a concrete pad. Posts measure 10' on center with 2" x 8" x 20' long #1 green treated tongue and groove material fastened to the inside of the posts 4' high. Stagger joints on posts to provide maximum wall strength. Rafters are clear span to provide maximum clearance and have a 4/12 pitch. Barn has 2" fiberglass condensation blanket with white vinyl facing between roof steel and perlines to serve as a condensation barrier. Center ridge is open the entire length of barn. End doors are metal roll up style with three on each end. All doors are 12' x 12' or as high as possible. Walls are roll up white vinyl (13 oz) approximately 6' x 75' in length and have a gear roll up mechanisms. Barn have 4" thick concrete floor in center alleys and traffic areas.

Colostrum – The Essential Factor in Successful Calf Raising

Feeding colostrum is essential to attain consistent colostrum passive immunity transfer to calves within the first 24 hours after birth. Calves from the 3 commercial dairies are picked up approximately every other day and brought to the calf and heifer facility at Waseca. On arrival, calves are from 18 to no more than 72 hours old. Blood samples are immediately drawn from calves upon arrival and checked for total serum proteins using a refractometer. Total proteins are measured in grams/deciliter (1/10th of a liter) or g/dl. Total serum proteins greater than 5 g/dl are acceptable and indicate passive immunity transfer being equivalent to 10g/liter serum immunoglobulin G (IgG) concentrations, however, serum proteins of 5.5g/dl or greater are the ideal target. The best time to measure serum proteins is between 1 and 3 days of age. Research has indicated that improvements in calf health and performance between low (less

than 9.9 g/liter IgG) vs. high (greater than 10 g/liter IgG) passive immunity transfer gave an overall benefit of \$23/calf by weaning.

A recent serum protein profile from 214 heifer calves taken upon arrival at the Waseca indicated that 35.5% were greater than 5.0 g/dl, 40.2% between 4.5 and 5 g/dl, 21% between 4 and 4.5 g/dl and 3.3% less than 4 g/dl. Information on the serum protein level in calves is shared with each cooperating dairy producer who in turn uses the information to identify problem areas at their dairy that are limiting successful passive immunity transfer. In most cases, it takes only a small change in management operations to have over 75% of the calves achieve successful passive immunity transfer. Short dry periods, calving stressors, seasonal factors and age of dam all contribute to variation in passive immunity transfer along with not feeding an adequate quantity of high quality colostrum at the correct time of less than 2 hours after birth.

Once calves are moved into their individual pens in the calf barn, daily feeding and management routines are followed. Protocols for feedings, daily monitoring and health diagnosis and treatment are posted to help everyone involved in caring for the calves establish a consistent and routine management program.



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