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Calf Note #56 – Benefits of Calf Hutches for Housing Young Dairy Calves

Introduction

I was asked by a well known calf hutch company to prepare a summary of the benefits of housing young calves in individual calf hutches. In some parts of the world, legislatures have considered the benefits and risks of housing calves in individual pens or hutches. Some bodies have evaluated the health benefits of isolating calves versus the potential value of social contact when calves are housed in groups. In fact, some countries have passed legislation to eliminate isolation of young calves. The text below documents my position in this argument. I hope this is of value.

Summary

Calf hutches are one of the most effective management practices for improving health and growth of calves prior to weaning. They have been used successfully for many years throughout the world, and remain one of the most popular options for housing calves in the U.S. Hutches provide isolation, a critical component of calf rearing prior to weaning. Prior to weaning, the calf's immune system is underdeveloped and less competent to deal with infectious pathogens. Consequently, preweaned calves are more susceptible to infectious organisms, and the rate of morbidity is especially high prior to weaning. Surveys throughout the world have identified the preweaning period as the one of greatest risk for dairy calves.

Isolating calves from others to minimize the spread of infectious organisms is a widely accepted management practice. Moving calves away from others has been shown to improve health, reduce morbidity and mortality, and have no effect on behavior or later productivity. Many studies have shown that the reduction in morbidity and mortality associated with hutch housing is due to isolation and a concomitant reduction in pathogen exposure. In addition, properly designed hutches provide excellent natural ventilation which can further reduce incidence of respiratory diseases. At the University of Tennessee, research in conducted with calves housed in hutches. This management system is superior to others in our environment, and health of calves is almost always excellent.

Introduction

Neonatal dairy calves are born with profoundly limited ability to fight disease. Calves (and several other species) are born without circulating antibodies (or immunoglobulins) that allow the animal to recognize and kill disease-causing pathogens. These antibodies are acquired by the calf from consumption of colostrum in the first 24 hours after birth. Unfortunately, many calves consume inadequate amounts of colostrum, thereby increasing their susceptibility to disease. The acquisition of passive immunity in neonatal calves has been the subject of intense research in the U.S., the U.K.

and many other parts of the world. The most comprehensive review of the acquisition of passive transfer of immunity in calves is the book by J.H.B. Roy (1). In addition to marginal passive immunity, the calf's own active immune system is naive and depressed shortly after birth. Consequently, the animal's ability to respond to infections is often inadequate. The U.S. Department of Agriculture determined that mortality of preweaned dairy heifer calves was 11.0% in 1996 (2). Most of this mortality occurred prior to weaning (average age at weaning in the U.S. is 8 weeks of age) and was caused by enteric and respiratory infections (2).

Transmission of enteric pathogens causing disease in preweaned calves is mainly through inter-animal contact, or transmission through improperly cleaned utensils or the animal caretaker. The concept of isolating calves to reduce the transmission of pathogens to preweaned calves is a fundamental principle of calf rearing. The reduction of animal to animal contact can markedly reduce transmission of pathogens among calves. Group housing, on the other hand, increases the risk of widespread dissemination of pathogens should one become established in the herd. Grouping calves prior to weaning has been shown to increase the risk of fecal shedding of Escherichia coli O157:H7 in dairy calves (27).

Effect of Calf Hutches on Morbidity and Mortality

One of the most distinct advantages of housing calves in hutches (or other environment isolated from other calves) is the reduction in transmission of disease-causing organisms. Most diseases of preweaned dairy calves are enteric or respiratory (26), and most of these organisms become infective through inhalation or fecal-oral contact. Isolating calves from direct contact and providing adequate ventilation can markedly reduce the transmission of pathogens. For example, Quigley et al. (19) reported that preweaned calves housed in hutches had lower prevalence of Cryptosporidium, Eimeria and rotavirus compared to calves housed in individual pens in an unheated calf barn. Further, these calves generally exhibited fewer incidences of scours and improved rate of body weight gain compared to calves housed in pens (23). Jacobs et al. (22) reported that calves housed away from adults reduced the risk of exposure to bovine synctial virus. Calves housed in hutches had increased immune response, increased plasma IgG and lower plasma cortisol compared to calves housed in elevated metal pens (25).

Proper design of hutches to maintain a dry, comfortable environment is important for the health and growth of calves (15, 20, 21, 24). An important criterion related to the success of calf housing - whether in hutches, pens, or in groups, is adequate ventilation to minimize the pathogen load in the environment (14). In addition, the build-up of ammonia and other noxious compounds may impair a calf's immune response, thereby making the animal more susceptible to pathogens. The advantage of hutches in providing proper ventilation depends on hutch design. Most hutch manufacturers in the U.S. have designed hutches with sufficient doors, windows, and vents to provide sufficient natural ventilation for optimal calf growth and minimal stress. However, some "igloo" style hutches or plywood enclosures may provide insufficient ventilation.

Veterinary societies in the U.S. have discussed the efficacy of hutch housing for minimizing diseases prior to weaning (8). Japanese researchers have also recommended the use of hutches to minimize calf death losses (11).

Some research suggests no improvement in morbidity or mortality when calves are housed in groups (28). However, in this study diarrhea and pneumonia occurred in many calves (40-60% and 40-70%,

respectively), indicating severe problems with management and feeding during the critical preweaning period. It seems unlikely that conclusions about housing or other management strategies can be made under circumstances of poor management.

Effects of Housing on Growth, Efficiency and Behavior

Effects of isolation on calf health, growth, and welfare are well documented. Researchers in Utah (5) performed one of the more comprehensive evaluations of isolation (housing in hutches prior to weaning) versus group housing. In their study, Arave et al. (5) housed calves from birth to weaning in 1) groups of 6 calves/per (3 m2/calf); 2) in individual hutches (1.2 x 2.4 m) surrounded by wire mesh fences; 3) in hutches surrounded by plywood fences, or 4) same as 3) but with 10 min of handling/day. After weaning, calves were managed according to usual herd routine. There were no significant effects of any treatment on weaning weight, daily body weight gain, number of vocalizations in open field tests at weaning or in blood glucocorticoids. Grouped calves defecated and urinated more than others in open field testing. Calves in treatments 3 and 4 (housed in hutches surrounded by plywood) averaged more 3.5% fat-corrected milk than calves reared in treatments 1 and 2. The authors suggested that heifers reared in isolation were more docile and adapted better to the milking routine than calves in groups. In a study utilizing monozygous twins, the Utah researchers (28) reported that housing calves in isolation had no detrimental effect on the calves and it may have enhanced the human-animal bond.

Friend et al. (6) housed calves in stalls (56 cm x 1.2 m), pens (1.2 x 1.5 m), hutches (tied with collar and chain), and groups (8 calves/group). Calves housed in pens and/or stalls had elevated neutrophils, total serum protein, Ca, blood urea nitrogen, creatine kinase, triiodothyronine, thyroxine, and adrenal response to ACTH compared to calves in hutches or pens. These calves also stumbled and fell when placed in open field tests compared to calves in hutches or pens (7). Calves in hutches moved more than other calves to take advantage of sunlight.

Physiological adaptation of calves from one housing type to another has been documented (10). Generally, calves can adapt to changes in housing (stalls to hutches or hutches to stalls) within about nine days. However, type of hutch design may affect calf behavior, with 2.2 x 1.2 m hutches and a yard of 1.8 x 1.2 preferred in some studies (20). Housing veal calves in isolation and feeding with buckets was shown to increase stress when calves were handled compared to calves housed in groups and fed by automatic teat-feeder to six months of age. The significance of this finding relative to preweaned dairy replacement calves is unclear.

Others (30, 31, 32, 33, 34) have shown clearly improved growth and performance and reduced mortality when calves are housed in hutches compared to other methods.

Hutches in Severe Climates

Calves can be housed in hutches even in severe cold, although special diets are required to provide adequate protein and energy for thermogenesis (13, 17). Canadian research (3) indicated that calves housed in hutches in winter grew more slowly during the first week of life compared to calves housed in a conventional insulated barn (temperature was -30°C). However, from 7 to 49 days of age, calves in hutches grew faster than calves in the barn (0.36 vs. 0.33 kg/d). McKnight (4) also reported equal or better performance of calves in hutches compared to stalls in a barn. Calves grew as well, ate more starter and required fewer medical treatments compared to calves in the barn.

Environmental temperature can influence a calf's activity in calf hutches (9). In very cold weather (-25°C), calves spent daylight hours in front of the hutch, in the sun, and lay in the rear of the hutch only at night. During cold weather, calves consumed dry feed only during daylight hours; they spend >90% of the day standing and >90% of the night lying. At 14°C, calves were more active at night. In hot weather, calves spent much of their time lying in the rear of the hutch.

Rawson et al. (18) reported that average daily gains of calves housed in cold climates were consistent with those housed in warm climates. In addition, clinical, physiological and pathological findings indicated that cold temperatures in the study did not cause serious harm to calves. The authors further concluded that calves housed in properly managed hutches were cold tolerant.

Hutches have also been used in very warm climates (South Carolina, U.S.) with great success (16). However, proper shading and ventilation are important to maintaining a comfortable environment for calves (21).

Conclusions

Isolating young dairy calves for the first eight to 12 weeks of life is important to minimizing transfer of pathogens and consequent disease and death. Calves can be reared successfully in groups. However, the risk of an infectious organism causing disease is much greater if calves are able to transmit the organisms among themselves. Hutch are effective in reducing this risk. Therefore, their use is highly recommended for young, preweaned calves.

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