
Photoperiod, the duration of light exposure relative to darkness in a day, has significant impact on productivity and health of dairy cattle and other farmed species. A light:dark cycle of 16 h light and 8 h dark (16L:8D) is termed a long day photoperiod, whereas a 8L:16D cycle is termed a short day photoperiod. The physiological basis for the response begins with light perception at the eye and signaling to the hypothalamus and pineal gland to alter secretion of melatonin. Circulating melatonin increases during exposure to darkness from concentrations that are typically undetectable and thus the lighting schedule drives a pattern of melatonin release that allows the animal to track daylength. The most consistent endocrine effects of variable photoperiod are the responses of circulating prolactin and insulin-like growth factor-1, both of which impact growth and mammary gland function throughout the life cycle. Specifically, long day photoperiod increases lean growth in heifers and increases milk yield in lactating cows. In contrast, cows maintained on short days during the dry period subsequently produce more milk than those on long days when dry. Cows on short days when dry and those on long days in lactation have increased dry matter intake relative to herdmates on the respective opposite treatments. Managing lighting in barns is easily implemented with commonly available fixtures and lamps. Indeed, the choice of light installed is made by combining the highest efficiency lamp available for the effective mounting height of the barn. Typically, with lower ceilings, a compact fluorescent lamp is the most appropriate selection, whereas the higher mounting heights available in freestall barns are better suited to metal halide or similar high efficiency lamps. Recently, LED lamps have been recommended due to their superior energy efficiency, but direct, robust testing of LED lamps has not been reported. Low intensity red lighting can be used in facilities during darkness, as it is not perceived as light by many species, including cattle. Target light intensity is in the range of 150 lux at a level 1 m above the barn’s floor and that intensity should be maintained throughout the facility. Photoperiod manipulation is a low cost, high return method to increase a dairy herd’s productivity throughout the cow’s life cycle.

Key Words: dairy cow, housing, photoperiod

Implications of overstocking on the behavior, health, and productivity of dairy cows in the Southeast. P. D. Krawczel*, The University of Tennessee, Knoxville.

The survivability of dairy farms across the Southeastern United States is being challenged by a variety of factors, such as high costs of production and aging housing and milking facilities. One common response to this is to attempt to increase revenue by increasing herd size, yet keep costs low by not investing in related infrastructure. This approach may be counterproductive to the overall performance of the farm, as there is a growing body of evidence that suggests there are negative consequences on lactating dairy cows that are required to compete for resting and feeding resources. This presentation reviews the current understanding of: 1) the relationships among overstocking, behavior, health, and productivity; 2) the behavioral strategies that dairy cows use to mitigate the effects of overcrowding and potential consequences of these strategies on health and productivity; 3) factors that are spe-
cific to the Southeast that may impact the relationship among
stocking density and other considerations of housing manage-
ment; and 4) current gaps in our knowledge that should be ad-
dressed with future research. Overall, the behavioral changes
that were evident in overstocked freestall-based housing facil-
ities included a decrease in the number of hours spent lying
per day, an alteration of the feeding times and overall time
spent feeding, and increased antagonistic behaviors occurring
at the freestalls and feed barriers. From a performance
perspective, there were indications that both milk production and
reproductive success might be altered by overstocking either
the freestalls or feed barriers of a housing facility. The hot,
humid summers, which typify the region, and the age, design,
and management of freestall facilities represent 2 factors with
the potential to compound the overall impact of overcrowding
in the Southeast. On the other hand, the commonality of pas-
ture access in the overall housing strategy across the region
might mitigate some of the negative effects of overstocking
on lactating cows. The extent to which these interactions are
detrimental or successful when associated with overstocking
reflects a major gap in our current understanding of manag-
ing dairy housing systems in the Southeast. Beyond frees-
tall-based housing facilities, there is a growing interest in the
use of composted bedding pack housing in the region. How-
ever, there is little empirical data to support recommendations
for the space required per cow within these housing systems.

Key Words: behavior, dairy cow, housing, overstocking

0009 Managing heat stress in dairy calves and heifers:
Housing considerations. S. H. Ward*, Mississippi
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Dairy calves and heifers are often overlooked when consider-
ing not only cooling strategies but housing in general. Provi-
ding housing with cooling in the summer for both young calves
and older heifers could improve growth, subsequent lactation
performance, and profitability for the dairy operation. While
hutches for dairy calves have become fairly standard through-
out the industry, providing a source of shade over the hutches
has been shown to improve respiration rates and reduce skin
temperature of calves (Spain and Spiers, 1996). Coleman et al.
(1995) found a tendency for improved feed efficiency when
calves were housed in shaded hutches, along with lower rec-
tal temperatures. Calves that were housed under metal roofing,
with and without cooling, had lower temperatures, increased
IgG, and lower mortality rates compared with those housed in
hutches (with metal covers). Providing a source of shade over
hutches during prolonged heat stress can improve calf perfor-
mance, but cooling the shaded area may not result in further
improvements. Similar trends have been noted in older heifers
housed on pasture with different shade sources. Twenty-one
yearling, Holstein heifers (n = 7) were assigned to 1 of 3 pad-
docks, each with a different type of shade: 1) natural shade from
trees (T); 2) hutches (H); and 3) shade cloth (SC). All heifers
were fed a commercial grain mix and ryegrass hay, and grazed a
grass-legume mix pasture. Body weight, frame measures, rectal
temperatures, and blood samples were collected once per week.
Heifer behavior was observed twice weekly for a total of 24 h.
There was a tendency for decreased body weights in heifers
housed under SC, but ADG, wither height, or hip height were
not affected by shade type. Blood parameters were not affected
by shade type. Time spent in the shade vs. not was also not
different with shade type, but time spent lying was greater in
both T and SC when compared with H (P < 0.05). Temperature
was also lower in T and SC compared with H, which may have
contributed to decreased time lying down.

Key Words: dairy heifers, heat stress, housing

0010 Compost bedded pack barns as a lactating cow
housing system for the Southeast. J. M. Bewley,*1,
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A compost bedded pack barn is a lactating dairy cow hous-
ing system consisting of a large, open resting area, usually
bedded with sawdust or dry, fine wood shavings. Bedding
material is composted in place, along with manure, when me-
chanically stirred on a regular basis. Recently, the popularity
of compost bedded pack barns has unquestionably increased
in the Southeast (at least 80 compost bedded pack barns have
been constructed in Kentucky). Because of warm climates,
the compost bedded pack barn fits the Southeast particularly
well. Galama (2011) suggested that compost bedded pack
barns fit within goals of sustainable agriculture because of
benefits to the cow (space, rest, exercise, and social interac-
tion), farmer (low investment, labor extensive, reduced ma-
nure storage costs), and environment (reduced ammonia and
greenhouse gas emissions, odor and dust emissions, reduced
energy consumption). Producers report reduced incidence of
lameness and improved hoof health, resulting from greater
lying times and a softer, drier surface for standing. Cows may
be more likely to exhibit signs of estrus because of improved
footing on a softer surface, leading to improved heat detec-
tion rates. Compost bedded pack barns reduce the need for
liquid-based manure storage systems and provide producers
with the option to economically transport nutrients in a dry,
concentrated form to areas where there is an off-farm demand
for nutrients. The initial investment costs of a compost bed-
ded pack barn are lower than for traditional freestall or tie-
stall barns, because less concrete and fewer internal structures
(stall loops, mattresses) are needed. This system represents a
viable entry option for smaller, start-up dairies. Proper com-
pposting increases the bedding temperature and decreases
the bedding moisture by increasing the drying rate. Keeping
the top layer of bedding material dry is the most important part of
managing a compost bedded pack barn. The pack should be stirred at least twice daily. Stirring is typically accomplished while the cows are being milked, using various types of cultivators or roto-tillers. Poor management may lead to undesirable compost bed conditions, dirty cows, elevated SCC, and increased clinical mastitis incidence. Proper management of compost bedded pack barns includes facility design, ventilation, timely addition of fresh, dry bedding, frequent and deep stirring, and avoidance of overcrowding.

**Key Words:** cow comfort, compost bedded pack, housing,