Cow Comfort and Reproductive Performance
by Ray Nebel, Professor Emeritus, Virginia Tech

It is difficult to present scientifically defensible definitions and specifications for what constitutes "cow comfort", but there is no doubt those good managers "know it when they see it".

Today's dairy cow may face a wide variety of environmental stressors. These may include heat stress, overcrowding, infectious challenge, poor ventilation, poor footing, uncomfortable stalls, poor management of grouping and cow movement, and rough handling. The effects of heat stress on dairy cattle physiology and productivity have been well established. Studies have shown that heat stress during late gestation reduces calf birth weight and subsequent milk production. Dry cows provided with shade gave birth to heavier calves and produced more milk than cows not provided with shade.

Biological response to other forms of stress, such as crowding, poor ventilation, poor footing, and poor stall design, have not been well established for dairy cows. Overcrowding is common in free-stall barns and moderate overcrowding has been reported not to affect milk production if feeding management is good; however, overcrowding should be avoided in the close-up and just-fresh pens. Every cow needs to have a comfortable stall to lie in. Cows naturally seek to isolate themselves from other cows as parturition approaches; in such animals the inability to do so in confinement constitutes a major social stress.

The stress response consists of recognition of a stressor, the biological defense against the stressor, and the consequences of the stress response. It is this last stage that determines whether a cow's productivity and reproduction will be compromised (the stress becomes "distress") or whether the event passes without impact. In many cases the expedient response of an animal is behavioral, by attempting to remove itself from the vicinity of a stressor. For example, a timid cow will move away from the perceived threat of a "boss" cow. When this behavioral response is prevented or limited, say by overcrowding in confinement housing, then the impact on the timid cow may be more negative.

The neuroendocrine system responds with altered secretion of pituitary hormones in an attempt to restore normal function. Alterations in hormone function in response to a stressor affect nearly all functions of animal production, including metabolism, reproduction, lactation, immune competence, and behavior. All of the systems involved to deal with stress produce changes in biological function, and it is these changes that may directly affect the animal's well-being and productivity and reproductive performance. These changes result in shifts of nutrients away from biological processes occurring before the stressor. For example, energy being used for growth in a first-calf heifer may be diverted to cope with the stressor.

For many day-to-day stressors, this biological cost of the stress response is inconsequential. However, with prolonged or severe stress, or with multiple stressors, the biological cost of dealing with the stress becomes significant to the animal. A common

example is the increased incidence of respiratory infection (shipping fever) that results from long-haul transport of cattle. Individual cows respond differently to stressors and the responses may vary with the extent, duration and severity. It is almost impossible to determine the exact loss of reproductive performance due to stress except in extreme conditions; however, overcrowding, frequent group changes, and rough handling will impact the ability to achieve efficient reproductive performance.