

More Efficient Food Production Through Knowledge of

Animal Behavior

by W.R. Stricklin

Man's interest in animal behavior dates back to animal domestication and earlier. A deeper understanding of this scientific field could lead to more efficient livestock production, as this author elaborates on.



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A new scientific discipline is developing that may someday mean greater profits to livestock producers. This discipline is animal behavior. Animal behavior is an area of study being researched and taught at a growing number of animal science departments in the United States. The future for this developing discipline in agriculture is promising.

One can compare the development of the science of animal behavior to that of animal nutrition. One hundred years ago nutritionists knew different feedstuffs produced different levels of performance in animals. It was known that cattle fed hay gained less than cattle fed grain. Also, animal husbandmen thought grass contained unknown growth factors essential to cattle. It took many scientist-years to determine calories, amino acids, vitamins and minerals are components of feedstuffs. The unknown growth factors of grass were, in fact, vitamins. Nutrition today is a science that can mathematically describe a balanced ration. As a result of scientific research, feedstuffs today are more efficiently fed to animals.

Research beneficial to understanding social order

By understanding the components of animal behavior, scientists may eventually be able to design better housing and determine

more efficient production systems for animals. At this time, only broad areas of behavior have been defined by researchers. For example, it is known all farm animals have a social order similar to "peck order" among hens. When resources such as food or access to mates are limited, the dominant individuals in the group have priority of access. This is a principle of behavior recognized many years ago by biologists researching animals in the wild and it was also investigated by earlier researchers in animal and poultry sciences. Even though most agricultural production systems provide animals unlimited access to food, there are still situations where placement of troughs, pen

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shape or group size will limit some individual's access to feed. Therefore, time and space interact with social order to determine access to feed. After controlled research is conducted in this area, scientists should understand these relationships better and be able to advise producers accordingly.

Often the importance of the social order

of animals is not immediately recognized by animal husbandmen. Because food, water, space and shelter are usually available in excess to farm animals, the relationship between social order and level of performance is sometimes not apparent.

In the science of animal behavior, we might look at social order as a group vitamin. Just as the nutrition vitamin is essential to the individual animal, the social order vitamin is essential to the group.

Social order must be present for the group to function properly. Social order minimizes stress by establishing priority of access to resources and freedom of movement in the pen. In the absence of social order, continual fighting and social stress would exist within the group. As with a nutritional vitamin deficiency, the "diseased" state of the social order is more likely to attract attention. When there are low conception rates in large dairy herds, beef steer losses due to shipping fever, outbreaks of tail-biting in pigs or feather-pecking in chickens, the absence or failure of social order is usually suspect. When several animals are first mixed, much fighting occurs. Absence of social order is apparent at this time. Over a few hours or days social order becomes established and fighting decreases. Very large groups, continued mixing of individuals, or overcrowding can prevent social order from functioning properly.

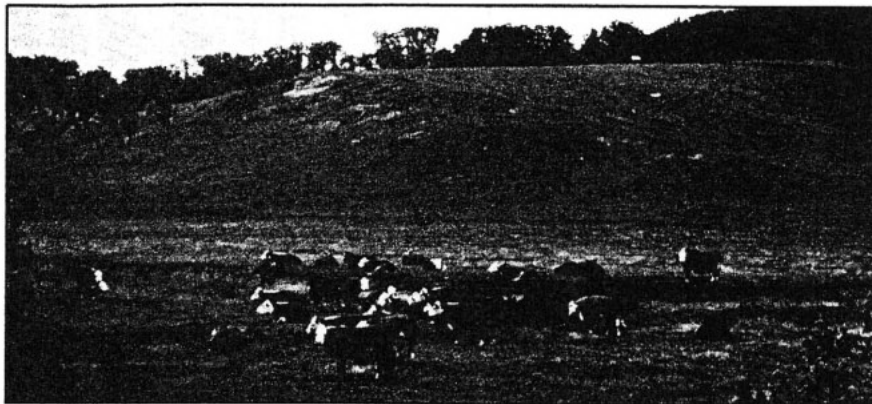
Behavior could dictate housing and management systems

Someday it should be possible to determine components of optimum group size and pen design for each species of farm animals. Much like balancing a ration, it should be possible to calculate optimum group size and composition, trough arrangement, pen size and pen shape. Just as the science of nutrition has taken many years to develop, it will also take many years for the science of animal behavior to develop completely.

Not to be confused with animal welfare

By studying behavior of animals to determine housing design, animal scientists should produce a system more suited to the animal's genetically based movement, spacing and activity patterns. As such, the study of behavior relates to animal welfare. Animal welfare is a very topical subject today, and persons often incorrectly use the terms animal behavior and animal welfare interchangeably. Animal welfare is only one portion of the discipline of animal behavior and is the concern of all animal scientists.

Most animal scientists recognize there are production practices that should be stopped or modified. Producing genetically hornless (polled) cattle results in fewer carcass bruises and eliminates the necessity of dehorning cattle mechanically. On a feed utilization basis, young bulls more efficiently convert feed to protein than do castrated cattle. However, the consumer and the present carcass grading system discriminate against bull-beef even though taste panel studies



Angus and Hereford cows, even though raised together from birth, have different social and spacing behavior patterns. At the University of Maryland Sykesville Beef Research Farm, Angus cows were determined to be socially dominant to Hereford cows, and while resting, the Angus cows tended to occupy the group center with the Hereford located on the group periphery.

Researchers of wild animals have found individuals on outer edges of the group tend to be more vigilant but are also more frequently killed by predators.

In domestic cattle the tendency of the more socially dominant individuals to locate in the group center may be a behavior that genetically traces back to wild ancestors of cattle.

Today, obtaining a location in the group center may still provide advantages to individuals such as some protection from face flies and other insect pests. Understanding the spacing and social behavior of cattle under natural environments should be useful to persons who design artificial confinement housing for cattle.

have demonstrated bull-beef from young animals is quite acceptable.

Veal calf behavior a priority

Most persons would like to see some veal operations modified, and veal calf behavior is a high priority research area of some animal behaviorists. Light deprivation does not result in white veal meat, and few calves are now raised in darkness. Sensationalism by media persons and an overly defensive position by industry persons are not likely to produce general improvements in production systems. Neither is a public boycott of veal in total likely to improve treatment of veal calves. Some veal calves are produced

the veal calf's living conditions. For a production system to be employed by a producer, the system must be economically feasible no matter how beneficial it may seem to the advocates who think they are serving the animal's interests. Historically, there have been times when the dollar return of dairy bull calves did not cover transportation costs to market. Some of these calves were destroyed and discarded at birth.

Preference tests must be carefully interpreted

Some persons argue farm animal environments should be based on those the animal would have in the wild or would choose in a preference test. A pet dog may prefer to eat steak or be "happier" when he eats fresh steak instead of canned horse meat and dried cereal, but most dogs eat very little steak. Legislation requiring dog owners to feed their dogs steak because of the animal's preference would be considered wasteful and ridiculous. While this example is not completely analogous to most production systems, it should be helpful in demonstrating that preference tests results must be carefully interpreted.

Animal behaviorists can collect data about animal preferences and, to some extent, animal stressors. However, animal behaviorists alone cannot resolve the animal welfare issue. Much like the human abortion issue, animal welfare is a philosophical, religious or political question. Scientists can collect information relevant to these issues, but they cannot be expected to resolve them to everyone's satisfaction.

Study of behavior should help optimize efficient utilization of both forages and grain by livestock on pasture and in confinement.

by beef cows on pasture. Meat from these "southern vealers" is sold primarily through fast food restaurants because the meat is darker. It is somewhat ironic that these fast food chains have been picketed. Veal they sell is primarily from calves raised by a natural mother and not products of the so-called "factory farm". A dairy cow must produce a calf each year in order to produce milk. After birth, the future of that calf is to some extent dependent upon the price the public is willing to pay for different meats. Again, ironically, a veal boycott by the public could have a negative effect on

Beef cow physiologically and behaviorally capable of utilizing lower quality feedstuffs

The animal welfare issue is sometimes intentionally or unintentionally combined with such issues as vegetarianism and "world hunger". Early man domesticated animals with behavioral traits that allowed animals to reproduce and grow on foodstuffs not utilized by man. Modern day pigs, chickens, sheep and cattle are descendants of those earlier scavengers. Livestock **can** and **do** utilize food sources humans **cannot** consume. Livestock produce millions of pounds

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of protein annually from low quality foodstuffs such as grass and from citrus, distilling and bakery by-products, to name a few. Livestock also utilize low quality or coarse grains such as corn and barley which are consumed unprocessed by humans in moderate amounts and considered strictly animal feeds by people in some overpopulated and undernourished third-world countries.

The beef cow is one of the most remarkable of this world's creatures. Over eons of time she has been genetically molded by forces of natural selection. She is apparently contented while eating feedstuffs that would

be considered low in nutritional quality by many other animals. She is certainly physiologically and behaviorally capable of eating low quality feedstuffs and converting its energy to a form that results in her contributing a 400 to 500 pound calf to the human food supply each year.

Study of behavior needed to optimize efficient forage and grain utilization

We often make the mistake of using the feedlot as the symbol of the beef industry. At this time, the short term outlook for the feedlot industry is good. In the long term, I hope our standard of living will remain high, and I hope we can maintain the finished, quality product the North American beef industry produces. But, regardless of what happens economically to the rest of agriculture, the beef cow will survive. The biological efficiency of the ruminant and the amount of marginal land area in North America will always produce a niche for the beef cow. The beef industry probably spends a disproportionate amount of time defending growth promoting products of chemical companies and feed to gain ratios of feedlot steers. The beef cow as the converter of low quality feedstuffs from marginal land is a better symbol for the beef industry. Study of behavior should help optimize efficient utilization of both forages and grain by livestock on pasture and in confinement.

Man has always had an interest in animal behavior. Early man knew much about the behavior of animals out of necessity. To

hunt and kill animals and to escape capture by animals that preyed on man, knowledge of animal behavior was essential. Later, man's knowledge of animal behavior led to animal domestication. Today the successful herdsman knows much about the behavior of his animals, and he uses this information in his production system. It is not uncommon for the layman to "discover" and to utilize information before it becomes established in the scientific world. European milkmaids and herdsmen knew if they had contracted cowpox they were immune to smallpox prior to the medical discovery of immunization to smallpox through vaccination. The effect of night-time feeding on daylight calving activity was first "discovered" by a beef producer, has now been investigated and documented by animal scientists and is being reported to other producers by agricultural extension agents.

Researchers are attempting to collect, analyze and document through published information knowledge about animal behavior. By this process, scientific principles of farm animal behavior will be established. Over a period of time, the myths and mysticism that are sometimes associated with animal behavior should be replaced with factual information. As new information is gathered, some principles will be discredited. Some principles will be modified. Some principles will be superseded by new ones. Such is the way that all scientific disciplines function to serve the public's needs and interests. AJ