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Human/Farm Animal Relationships

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Introduction

A recent educational pamphlet entitled "We Need Farm Animals"[3] was issued from an enlightened self-interest group and stated:

> Humans and domestic animals have mutually benefited each other for centuries. Each contributes to the well-being of the other; humans provide the feed and housing for animals, and animals produce milk, eggs, fiber, meat, draft power, and recreation for humans. Animals give us improved nutrition, better health, and companionship. Animals help us enjoy greater prosperity and an improved standard of living.

Fourteen important contributions arising from farm animals were discussed.[4] At the top of the list was the category of "Needs of Humans":

> Animals fulfill a basic need of humans—a desire to be wanted and accepted and to have something rely on us for attention and care. This may explain why most farmers feel so close to their farm animals. Animals also serve as companions and pets and contribute to our recreational needs. Contributions of animals as companions are significant even though it is difficult to quantify the pleasure and emotional value. Animals used in sports such as horse racing provide jobs and income for many people and entertainment and recreation for millions.

A final statement summarized and concluded:

> ...Many people of the world are supported almost completely by animals because they live in areas unsuitable for crop production.[5] Animals have proven to be vital and necessary for the nutrition, by-products, economic benefits, and companionship that they provide. Animal products are excellent complements to fruits, vegetables, and cereals, and they are needed to ensure a complete and balanced diet. Many additional products that come from animals often are not recognized as being of animal origin, but they contribute very much to our lives. The contributions of livestock are so great that animals are essential to the well-being of humans in all parts of the world.

Human/Farm Animal Interactions

At a conference on the Human/Animal Bond, Kilgour (1983) reported as follows:

> Humans keep animals, birds or insects for food, apparel, traction, cartage, sport, entertainment, scientific research, and industrial uses. Considerable control is exercised over mate selection, reproduction, maternal care and rearing, group size and composition, feed offered, living quarter space and design, etc. The "domestic contract" or "trade-off" is not entirely one-sided. Animals are protected from the worst exigencies of climate, seldom are without adequate food, and are comparatively healthy and protected from predators. In a sense the current concerns raised by animal welfarists are part of a re-examination of the terms of the domestic contract or the trade off implicit in "domestication." It is appropriate that this contract should be re-examined each few decades. Recent intensification in the animal industries and the growth of automation make it important for society to re-evaluate its stance to domestic animals.

Farm animals are also being kept as pets, as evidenced that there are more than 100 pigs now living in residential areas in the United States (Schwadel 1986).

Homo sapiens is one of the few species to enter into extended and complex social relationships with other species. In some cases, such as the milker with the cow, the shepherd and the dog, and the rancher with a horse, this may involve staking one's food supply and income, well-being, and even life on the trust and success of a close relationship. In the social contract between caretaker and animal, it seems obvious that the handler should acknowledge and accept appropriate behavior.

Human/Animal Combinations.—There are various combinations of human beings and farm animals. This paper attempts to evaluate those few studies of humans handling farm animals within a prescribed environment. Personality traits of dairy farmers and livestock people as determined by the Eysenck Personality Inventory (Eysenck 1977) need further study (Seabrook 1974; Arave and Brown 1979). Seabrook's sample size was small (20 herds) and these herds were criticized for having low yields while Arave and Brown's questionnaire did not go far enough.

The classical model is the human/animal relationship. Occasionally there are others. Different pathways are proposed as follows:

Human ⟶ Human/Animal

These models will be illustrated through two accounts. At the state mental institution herd, Medical Lake, Washington, they had an increasing number of dairy calves becoming ill with unusual behavioral symptoms. The herd manager investigated and questioned the various inmates including the calf feeder. The problem continued. As a last resort the herd manager decided to observe the various inmates and their visits to the calf barn. Finally, one particular inmate after dinner went past the garbage cans back of the pharmacy where he picked up a handful of assorted pills and headed for the calf barn.

Here the larger scene unfolded. In front of each calf, the inmate noted that the calves did not look well. Each night he would treat each calf to some unknown drug prescribed best to humans. The mystery was solved and this episode illustrates the importance of human-to-human observation and interaction with the drastic effects of indiscriminate dosage upon an animal's behavior and well-being.

Human ⟶ Animal/Animal

The other incident took place on sabbatical leave at the New Zealand Ruakura Animal Research Station. One evening after hours near the large animal learning maze, there was considerable commotion with the large group of tethered dogs barking incessantly. Then there would be quiet, followed by whistling and then barking. The resident mynah birds hidden in a grove of trees nearby had learned to imitate the human shepherd's whistles (calls) for herding sheep. Each evening the mynah birds would rehearse and deliver a chorus of whistles, driving the dogs to distraction.

Domestication and Tameness.—According to Murphey et al. (1981), domestication efforts have not been totally successful. Even after millennia of husbandry, behavioral control through forced compliance and confinement is still practiced. Physical restraints imposed upon livestock can result in lifelong dependence on the captors, with consequent cultural changes bringing about human dependence on the captives. Price (1984), in a recent review on domestication, searches for clues and behavioral aspects of animal domestication. In his study, he reminds us that:

> ...(perhaps) the first requirement for the successful domestication of any species is that man, the domesticator, have a recognized need or desire that can only be satisfied by controlling, protecting, and breeding a certain population of animals. So far, few species have been domesticated for other reasons (e.g., food production, companionship). During domestication some traits have become more or less frequent and conspicuous. During domestication body size has generally increased for some species (e.g, horse, rabbit) and has decreased for others (e.g., cattle, sheep). Some phenotypic characteristics (e.g., body color) of certain domesticated species have become more variable during domestication, whereas other traits (e.g., tameness) have become less variable.

Also according to Price (1984):

> Darwin suggested that domestication is more than taming, that it includes breeding animals in captivity, is goal-oriented, may occur without conscious effort on the part of man, increases fecundity, may bring about the atrophy of certain body organs, enables animals to achieve greater plasticity, and is facilitated by subjugation to man, the domesticator. Some contemporary definitions postulate that domestication is a condition in which the breeding, care, and feeding of animals are more or less controlled by man. This definition implies that a population of animals is rendered domestic by exposure to the captive environment and by the institution of certain management practices.

Farm animals selected and domesticated by man are very social by nature (Kilgour 1983). They are characterized by a dominance hierarchy, where man is able one way or another to establish dominance over every member of the animal group. Quite the opposite of the way successful cowmen and milkmaids handle milk cows through TLC (Tender Loving Care), the Fulani culture in northern Nigeria has made a general social virtue of the aggressive dominance that is vital in the husbandry of their cattle. A high level of aggressive, assertive, combative behavior, both verbal and physical abuse, is not only accepted but demanded in social relations with one human male to another and to their cattle (Lott and Hart 1977).

An important point often overlooked is that the temperament of farm animals is influenced by the temperament of their caretakers (Stricklin and Kautz-Scanavy 1984). With high-producing dairy cattle, a cow's fear of an aggressive handler may upset her if she has a nervous temperament. Temperament in cows is quite an important aspect of cowmanship as one undisciplined cow can unsettle the entire herd. (Burnside et al.[1971], reported that problem dairy cows—slow milkers or bad temperaments—culled and sold represent 3.6, 2.1, 2.1, and 1.9% of all Ayrshire, Guernsey, Holstein, and Jersey disposals, respectively. Of the problem cows, 42% of the Ayrshire, 10% of the Guernsey, 29% of the Holstein, and 37% of the Jersey cows were categorized as having bad temperaments.) Schmidt and Van Vleck (1974) categorized the different dairy breeds for temperament as follows: Ayrshire (nervous), Brown Swiss (docile, stubborn), Guernsey (docile), Holstein (docile), and Jersey (somewhat nervous).

Some farmers buy other farmer's culls knowing that they will become top quality cows in their herd. Therefore the handling of the cow has a lot to do with her temperament. Even in large herds, dairymen will have favorites among herd members. Well-adjusted cows show ready movement into milking parlors with or without grain as an inducement. Cows will often readily approach good herdsmen. It has been suggested that the true test of cowmanship is whether the cows exhibit approach behavior and come to the herdsman in the pasture (best) or turn away as he approaches (worst) or just stand still (neutral) when he comes closer (Albright 1978, 1981a).

Spatial Reactivity of Animals.—The spatial reactivity of animals to intruders with appropriate behavior terminology has been compiled by Waring (1985):

> Animals exhibit specific reactive distances. For example, an approaching intruder first causes an animal to become attentive when it reaches the "investigative distance." The animal detected the approaching intruder when it reached the "perceptive distance." The distance at which an animal first begins to flee from an intruder is the "flight distance." The distance the fleeing animal then places between itself and the intruder before ceasing flight is the "withdrawal distance." When inhibited from fleeing, an animal first becomes defensive toward an approaching intruder at the "aggressive distance." The space around a resource defended by an individual or group is a "territory." The minimum distance tolerated between individuals under normal conditions is the "individual distance"; this creates a "personal space" around the individual ("group

space" in the case of groups). The "strike distance" is the extent of a stationary animal's reach for inflicting physical harm on an intruder; in birds, it is often called "peck distance." A "submissive distance" is where an individual first shows cringing or other submissiveness when nearing a dominant. And the maximum distance an individual wanders from members of its social group under normal conditions before starting to return is called the "social distance." Reactive distances and their magnitude are influenced by the environmental context, physiological and psychological state of the animal, intensity of stimulation, experience, etc. Reactive distances are evident under free-ranging as well as captive conditions, and can be important to anyone trying to approach, manipulate, or manage animals.

Approach-Avoidance Relationships.—Undomesticated ungulates and domesticated cattle have paradoxical tendencies both to approach and to avoid humans (Hediger 1955). Murphey et al. (1981), have reviewed approach avoidance responses. Approach (investigating a person lying on the ground) and avoidance (flight distance) were studied among 525 cows—25 animals observed in 21 Brazilian herds of *Bos taurus*, *Bos indicus*, and *B. taurus* × *B. indicus* breeds. (Seven herds were compared in their investigatory responses to a human and a ball. Breed differences were evident for approach and avoidance behavior which had little relationship with one another. When reactions to the person and ball were compared, the responses were also breed specific and negatively correlated. Age took precedence over breed in investigating the human in a predator-prey context.) One observer (Murphey et al. 1980, 1981) stationed himself in or near each herd for 30 minutes recording the animal's general activities while allowing them to become accustomed to his presence, after which he tested the flight distance ("approach ability" or "unconceded distance") of individual cows. He used a split-image range finder and careful pacing (approximately one stride per second) to learn how close he could walk toward her before she fled or Murphey could touch her head. Murphey et al. (1981) found that there are breed differences in flight distances and that dairy cattle have less flight distance than do beef breeds. Earlier, dairy cattle were estimated to have a flight distance to man of 12 feet and beef cows of 16 feet (McFarlane 1976). In high-producing cows or in the country with the highest milk production per cow in the world—Israel—claims are made for their Israeli Friesian cow's degree of tameness and their zero flight distance (McFarlane 1976; Albright 1978). In the world's record milk producer Indiana Holstein Beecher Arlinda Ellen's case with the Beecher family waiting on her almost continuously throughout her life, it is easier to explain her zero flight distance, overall tameness, temperament, and willingness to approach family and stranger alike.

The fact that all of the dairy stock were more approachable by the human than were beef cattle in the Murphey study should not be too surprising. Dairy breeds have undergone considerable behavior-genetic selection to facilitate milking and they tend to be handled differently and to have had more contact with humans during their development than have beef cattle. This also makes dairy cattle more dependent upon humans than their beef

counterparts. Beef animals tend to be better mothers than dairy cattle (Selman et al. 1970a, b) and come fairly close to fitting Kilgour and Dalton's (1983) behavioral definition of cattle:

> Cows are large, hairy ruminants living in herds which roam over a large area of grassland. The female withdraws from the herd to produce one (rarely two) precocial young which soon stand and suckle four to six times a day. They "lie-out" away from the dam for at least the first week of life during the daytime. These lying-out patterns together with head threats act to set greater distances between cows in the herd than sheep in a flock. In small herds, straightline social dominance ranks are found and these are stable over many months...

Stockmanship.—Stockmanship can be defined as "knowing the individual behavior of every animal in one's charge, and having the ability to recognize small changes in the behavior of any animal or all of the animals collectively" (Seabrook 1977).

According to Hollier (1979), there is an interaction of the pig with its physical surroundings, other pigs in its group, and with the person responsible for looking after its needs. In order to achieve better performance of growth efficiency, the pig is placed in an environment where it is dependent upon humans for most of its requirements. More of the physical aspects of the environment such as temperature and the basic social requirements such as stocking density and feed space just now are being understood. There is insufficient attention to the importance of having a trained person looking after the pigs. Developing a code of behavior and personal discipline in an approach to looking after intensively kept animals is going to become increasingly important in maximizing response in pig performance.

Good stock people exhibit three characteristics compared to the untrained person (Hollier 1979):

> Firstly, they are perceptive to conditions from the animals' point of view and have developed the discipline of trained observation of the health, comfort, and welfare of the pigs as a method of assessing ongoing performance levels.

> Secondly, they take the trouble to ensure that as soon as they see something is wrong it is **put right immediately.**

> Thirdly, they organize pig flow through the buildings by planning their production line. This means that at all times input, output, and inventory of pigs on hand are as closely balanced to the physical limitations of the building as is practically possible.

Observation is a key ingredient in stockmanship with a willingness on the part of the stockman to correct the conditions causing the deviation from normal behavior pattern.

According to Anderson (1974):

> Husbandry or stockmanship, the relation between man and his animals, although commonly recognized as being an important item in terms of man himself, particularly in the responsiveness of his animals, has received meager, if any, attention from the investigator. If indeed animal response is influenced by human behavior, what are the factors involved and can they be measured and disciplined so that chance alone is not the mediator?

In terms of job satisfaction there are five basic categories of human needs, and, as a general principle, the satisfaction of each group serves as a prerequisite to the next group. These groups are (1) biological needs, (2) safety and security needs, (3) need for affection, belonging, love, (4) the need for esteem and (5) self-actualization needs or full potential (Maslow 1970; Curtis 1983).

The Stockman's Personality and Milk Yields.—English dairymen and their cows were observed in a series of studies (Seabrook 1971, 1972a,b, 1973, 1974, 1977, 1980, and 1984). They defined good stockmanship as the "knowledge of the behavior of individual cows in the herd and the ability to notice deviations from normal behavior." From a study of about 50 herds of similar size (50-80 cows), composition, facilities, and management, Seabrook found that milk yield differences were accounted for by two factors, the level of concentrates fed and the herdsman. Of the 20% differences in milk yield between farms, concentrate levels between herds accounted for only about 25% of yield differences. This led to a long-term study in 20 herds of the herdsman and his personality. The frequency of recorded comments of various subjects of verbal and non-verbal signals, the frequency of human displacement activities like head scratching, yelling, cursing, and the interactions between herdsman and cows were recorded across all seasons and times of day. ("The herdsman considered it to be a study of cow behavior!") Stockmanship is best exercised when a high proportion of time is spent in contact with the cows, yet on one-man units, up to 60% of the working hours may be spent on non-cow contact. Such jobs causing high frustration should, whenever possible, be mechanized and simplified. Human annoyance can reach high levels just before meals, and if non-contact jobs are done then, the work is generally poor and careless. Human fatigue reaches its peak during milking when one-third of the cows remain to be milked, irrespective of herd size. Displacement activity levels peak at this point and the quality of decision making drops. The best human personality type for single unit dairy farms was characterized. A self-reliant, confident, introvert, quiet, reserved, non-sociable ("grumpy") person with cows can easily out-produce (eight herds with 5,191 liters) a similar person lacking confidence (six herds of 4,535 liters), while a confident extrovert ("cheerful Charlie") tends to have only average production achievement (4,629 liter average in six herds). A sound relationship is based on communication as well as confidence.

Some competent cowman talk to their cows when they are under stress. They use a pleasant voice but at times display the necessary dominance. The good communicator is somewhat placid, rather than excitable, and he reinforces good behavior by pleasant words and touch (contact comfort) with his cows. Seabrook (1977) also listed three other rules: patience, consideration for the needs of the cow, and consistency.

In the case of a good stockman, the animals do well and production is high, whereas the poor stockman can reduce productivity, although he apparently does all the jobs that are expected of him. The classic example of this effect is illustrated by the experience of Hampshire farmer, Rex Patterson, whose herds Martin Seabrook studied. Rex Patterson classified his tenants as "stockmen or milk extractors" in terms of the yield they obtained from the many dairy herds he owns. As a result he and his manager found that a good stockman and his attitude towards his cows will obtain up to a 20% increase in milk yield over a poor stockman on the same farm (Kiley-Worthington 1977).

Herdsmen in High-Producing Herds.—The personality of herdsmen was assessed in large, high-producing herds in the United Kingdom and North America (Reid 1977). The assessment of the 25 herdsmen in the study showed 17 of them to be of the confident introvert category. Some of the traits which the herdsmen in this study had in common were: instant recognition of each animal in the herd; a high percentage of their cows approached them; the average number of hours worked was 63 (because of their nature and interest, many herdsmen were only content when spending over 60 hours a week with their cows); 23 were married, all possessed a motor car, only one herdsman had further education; few had interests in community, church, or sports but several had gardening as a hobby. (Each of them in the United Kingdom grew flowers. In particular, roses, gladioli, chrysanthemums, dahlias, and wallflowers were grown by the herdsmen and these particular species require special treatment at specific times of the year, and like cows, respond to feeding). They (21 subjects) had a pet or pets, and almost everyone had kept rabbits, guinea pigs, hamsters, or mice as pets when they were children. Many had hand milked cows before the age of 10, most had few close friends while in school. Reid (1977) summarized the high-production herdsman as obtaining a higher percentage of the milk yield which her genetic capability permits than others would obtain from the same cow in similar large herd conditions (85 to 130 cows). The high-production herdsman achieved this by constant attention to the behavioral pattern and performance of each individual cow within the herd. His ambitions are complementary to the best interests of the dairy industry and his employer, who also tended to work long hours averaging 76 with a minimum of 40 and a maximum of 90. The herdsman recognizes that hoping without working creates illusions.

Opportunities for encouraging cows to associate the herdsman with pleasant feelings will occur during handling before calving, at calving time, in the collecting yard, and during milking. This relationship can be reinforced by feed rewards, patting the cow, tone of voice, and approaching the cow.

Account needs to be taken of the role of the human as a calf substitute (Seabrook 1977).

Effects of Human Handling of Chickens (Hens and Chicks).—Hughes and Black (1976) of Scotland found that handling caused stress and reduced egg production but only in hens not accustomed to it. Regular handling had no effect, indicating the hens had habituated to it. Depressing or stimulating effects of handling may be finely balanced with inherent fearfulness as a controlling factor. Irregular handling depresses performance, while habituation occurs during regular handling. Once the initial fear responses have waned, the extra stimulation provided by regular handling may enhance ability to adapt to other novel and stress-inducing stimuli.

There is little agreement about the effects of handling upon chicks' growth rates. Some authors (McPherson et al. 1961; Reichman et al. 1978) concluded that handling immature broilers and pullets had no effect, whereas Freeman and Manning (1979) found that regular handling decreased growth in chicks of a layer strain. Thompson (1976) and Gross and Siegel (1979) found increased growth following handling in broilers and layers, results consistent with findings in rats (Ruegamer et al. 1954; Weininger 1956; Levine 1962). Different handling regimes, methods, strain, sex and age differences may help to explain these inconsistencies (Jones and Hughes 1981).

The effect of regular handling (twice-daily) on growth and gain-to-feed ratios in male and female chicks of layer (two strains) and broiler strains were examined from hatching to three weeks of age in six batches of 160 birds each by Jones and Hughes (1981). Growth was significantly enhanced by regular handling in broilers and the females of the layer strains, and gain-to-feed ratios were generally greater in the handled birds. There were no significant treatment effects on growth or gain-to-feed ratios in males of the layer strains. Males had higher relative weight gains and gain-to-feed ratios than females.

The improved performance of the handled broilers agrees with the findings of Thompson (1976), but conflicts with those of McPherson et al. (1961) and Reichman et al. (1978), who found no effects of handling on growth. The birds were handled once weekly in the latter two studies, whereas Jones and Hughes' (1981) birds were handled twice-daily and those of Thompson were handled once a day for 15 days from hatching. The birds used by McPherson et al. (1961) and Reichman et al. (1978) were one and nine weeks old, respectively, before stimulation began, whereas Jones and Hughes' birds were handled from the first day of life. It is likely that the inconsistencies can be explained in terms of either differences in intensity of stimulation or the existence of a sensitive period.

The chicks of Freeman and Manning were handled twice-daily for five days per week for three weeks; a little less stimulation than that perceived by chicks handled by Jones and Hughes (1981). The interval on weekends producing an irregular regime may be an important factor. Strain differences may also account for this disagreement but Freeman and Manning weighed only a small number of chicks and did not distinguish sexes.

In a United States study by Gross and Siegel (1982), chicks were habituated to human beings (socialized) by being talked to, offered food, and handled gently within an environment with a minimum of noise. After seven weeks of socialization, the birds were challenge exposed with *Escherichia coli*. When compared with ignored groups, the socialized birds showed more than a 60% reduction in the prevalence of death and pericarditis. Furthermore, small flocks of socialized birds were more uniform in their response to *E. coli* than were similar nonsocialized flocks. Socialized chickens also had improved feed efficiency and increased antibody response. Socialization was also applied easily to larger flocks of chickens. Socialization of chickens to their handlers by being talked to, offered food, and handled gently results in increased feed efficiency, growth rate, uniformity of responses to all tests, resistance to stressors, antibody response to antigen, blood protein, and increased resistance to a wide variety of infectious agents (Gross 1983).

Responses of Pigs to the Presence of Humans.—Twelve commercial one-man pig farms of medium to high productivity were selected for the study of Hemsworth et al. (1981). A large integrated company controlled the farms providing pigs, feed, weekly management and twice-weekly veterinary advice. The 12 Dutch farms had very similar inputs apart from the ability of the stockman.

Two different behavioral tests were conducted on 1,225 and 480 pregnant sows, respectively, to examine their behavioral response towards humans: Sows displayed a significantly ($P > 0.05$) greater withdrawal response to the approaching experimenter's hand (Test 1) and a significantly ($P < 0.05$) lower approach behavior towards the stationary experimenter (Test 2) at farms in which the average total number of piglets born per sow per year was low.

The achievement and maintenance of a good human/animal relationship requires an animal's understanding of the type and nature of signals released by humans. In a follow-up experiment in the United States by Hemsworth et al. (1983), two experiments were conducted to evaluate the nature of several common signals. Both experiments were a 2 × 2 factorial of signal involving 48 and 44, 10-12 week-old pigs. The nature of the signals was evaluated by quantifying the approach behavior of the pigs to the experimenter in four three-minute tests over an eight-day period. Non-approach, squat posture (closer to the pigs) and bare hands by the experimenter were associated with an increase in the approach behavior of the pig. Therefore, naive pigs appear to interpret these signals to be nonthreatening in nature. There were also significant differences in litters on approach behavior.

These experiments demonstrate that the nature of signals released by humans can be identified. The effects of handling and stimulating on the behavior of young pigs were studied by Grandin et al. (1983). Pigs (24 four and a half-week-old Hampshire-sired crossbred) from five litters were placed in either a "stimulating" or a "nonstimulating" environment. The "nonstimulating" environment consisted of placing two pigs in each of six 1.22 m × 1.22 m nursery pens with plastic-coated expanded-metal floors. Lighting and temperature in the room were constant and the pigs were not handled except for adding feed to the self-feeders once-daily and cleaning the pens

every third day. The "stimulating" environment consisted of 12 pigs placed together in one outdoor pen with a concrete floor and adjoining house bedded with straw. These pigs were handled and played with for at least 15, and often, 30 minutes daily and also provided with objects ("toys") with which to play (e.g., plastic milk crate, garbage can, chains, cloth strips, dirt, stones, newspapers, cardboard boxes, ropes and twine). The objects were changed daily. At the end of the nine-week trial, approach times to either a strange man or a novel object (red feeder standing on end) were measured in a 2.74 m wide octagonal pen with 1.22 m high white plywood walls and brown plastic carpeting on the floor. There was a three minute time limit. Resulting data were: Approach man: "stimulated," 59.5 seconds; "unstimulated," 100.3 seconds. Approach novel object: "stimulated," 49.8 seconds; "unstimulated," 83.5 seconds. Differences among litters were also apparent. One stimulated pig vocalized during the tests, and she and her littermates were slower to approach the man regardless of rearing environment (125.9 seconds vs. 60.9 seconds). Observations indicated that the pigs would stop playing with an object unless it was changed often, and the pigs played with some objects longer than others. If an object (e.g., bowling ball) became contaminated with manure, the pigs tended to avoid it.

Previous studies in the farm animal area have been limited from behavioral tests (swine), to once-daily (chicken) as well as close twice-daily interaction between the cowman and individual cows in the herd. These innovative, one-of-a-kind, creative studies attract a great deal of interest and comment; however, they are difficult to duplicate and repeat. Also, with more reliance placed upon machinery and controlled environments, currently there is less emphasis upon animal handling and husbandry-like skills. Thus, there is less time spent per food producing animal except in the case of the companion farm animal species such as the horse, goat, and dog.

Humans Are a Part of the Problem and Solution.—Other human/farm animal relationship studies include work on early experience (Albright 1981b; Donaldson 1970; Donaldson et al. 1971, 1972, and 1974). They showed social isolation during an early developmental period increased later milk production in Holstein dairy cattle.

Behavior modification is a powerful tool and it has been used to train dairy cattle by operant conditioning methods (Wisniewski 1977; Wisniewski and Albright 1978a, b). Through proper training of the cows and milking parlor operator, cows were induced to cooperate within the system instead of being forced to conform. Data collected by Wisniewski (1977) from 12,222 individual cow observations at milking times during a one year period using a double-five herringbone parlor system showed that routinely only 2.8% of the cows entered the milking parlor voluntarily or unassisted. Stated another way, the strategy of 97.2% of the cows was to wait for the milker to come and to coax them through the doorways into the milking stalls. Training of Holstein heifers and cows to enter the parlor using operant conditioning (with a training stimulus of either the door opening, flashing lights, or a buzzer) with negative reinforcement (shock prod) resulted in

peak performance observed on day 7 when 99.2% of the cows entered the parlor by themselves. Performance of the cows decreased after the training period (64.9% entering unassisted vs. 80.7%) but this represented a 200-fold improvement over the pre-training period (2.2%). Untrained and partially trained cows followed the fully trained cows into the parlor.

In the above studies by Wisniewski, the leadership-followership behavioral trait is used to advantage. The urge to follow in a species being as great as the urge to lead causes group activity and movement to and from pastures, into and out of chutes, milking parlors and electronic feeders.

The domestication and taming process illustrate the close human/animal bond whereby "imprinting" (Albright 1982) as well as restraint, handling, training, and exhibiting animals takes place.

Those interested in the care and welfare of farm animals are concerned by what animals (and not humans) would choose when presented the opportunity. One such early test to determine how animals think, anticipate, and react was developed by Krushinsky (1965). With pigeons, hens, crows, rabbits, cats, and dogs, the reinforcement principle was utilized by placing food in one of two feeding bowls which stood side by side at the gap behind a screen. When an animal started to eat the food, both bowls were moved in straight lines in opposite directions. After covering a distance of 20 cm. the bowls disappeared behind non-transparent flaps. To solve the problem, the animal had to move around the screen on the side behind where the feeding bowl had disappeared. Experimental animals had success rates of: pigeons (7%), hens (52%), crows (86%), rabbits (27%), cats (86%), and dogs (89%).

Krushinsky's technique was adapted to farm animals so as to provide a slow-moving trolley carrying food within a large animal learning maze. It disappeared into an A-frame tunnel and, after certain periods of time, reappeared at the other end (Albright et al. 1982). Three dairy cows were tested. When the food trolley moved, they demonstrated a "startle" reaction (staring at the object with front feet firmly planted) which may have inhibited the learning process. It took them two weeks before they learned to continue eating from the moving food box and anticipate the reappearance of the trolley. After our human presence was removed, success came about by observing the cows with a TV monitor. The cows had become conditioned and dependent upon humans expecting us to remove them from the testing area after the food disappeared. They explored and solved the problem only after we were out of sight. Since cows learn from each other, each cow and later each bull were put in the testing arena separately. Earlier, another 10 of 11 cows "startled" when the food object started moving and they did not learn how to solve the problem.

None of the eight dairy bulls (four Jersey and four Friesian) learned to anticipate and had a larger startle response than cows. They stopped eating once the food box was set in motion. They showed a startle reaction when the trolley was 9 to 10 m away from them.

In addition, 12 out of 15 pigs were able to "extrapolate" from a known situation within three days, and six out of seven rams tested in four days.

Summary

Humans and farm animals contribute to the mutual well-being of one another. Humans provide the care, feed, and housing for animals that produce food, by-products, fiber, work, recreation, and also improve human nutrition, health and companionship. Although the bonding and relationship between handler(s) and livestock may be important, it has been difficult to study and to quantify. After proper bonding, each time an animal is handled it will be more tame and pliable. Significant relationships between personality characteristics of dairymen and milk production per cow were found in England and verified in North America. In surveying 50 one-man dairy herds of 50 to 80 cows, 11% more milk and greater willingness of cows to enter the milking area were obtained by those dairymen classed as confident introverts than by confident extroverts. Training of Holstein heifers and cows to enter the milking parlor using operant conditioning resulted in peak performance observed on day 7 when 99.2% of the cows entered the parlor by themselves as compared to the pre-treatment period of 2.2%. A Dutch study strongly suggests that the reproductive performance of pigs is associated with the relationship between the stockman and breeding stock. Later U.S. pig research demonstrated that handling and the nature of signals released by humans can be quantified. In Scotland, growth in broilers and layers was significantly enhanced by regular handling. Socialization of chickens to United States handlers by being talked to, offered food, and handled gently results in increased feed efficiency, growth rate, and resistance to stressors.

Endnotes

[1] Invited lecture for Symposium I: Applied Ethology, Midwest Animal Behavior Society Meeting, Southern Illinois University at Carbondale, IL, April 28, 1984.

[2] Professor of Animal Sciences,Dept. of Animal Sciences, School of Agriculture and Large Animal Clinics, School of Veterinary Medicine, Purdue University, West Lafayette, IN 47907. Also, Purdue Center for Applied Ethology and Human/Animal Interactions. This investigation is part of the Indiana contribution to NCR-131 Animal Care and Behavior and NC-119 Improving Dairy Herd Management Practices.

[3] Leaflet "We Need Farm Animals" is available from the American Society of Animal Science, 309 W. Clark St, Champaign, IL, 61820.

[4] Topics listed and discussed were on the Needs of Humans; Human Nutrition; Enjoyment of Eating; Recycling of Nutrients; Use of Crop Residues; Use of Industrial By-products; Use of Noncrop Land; Economic Contribution; Use of Feed Grains; Provide Fibers; Animal By-products; Food Storage; Power (Draft); and Human Research Applications. A summary statement and five references for additional information are included.

[5] Elsewhere in the pamphlet a vital, appropriate statement is made: "Due to inadequate rainfall, rocks and rough terrain, only about one-fifth of U.S.A. land is suitable for cropland. Worldwide the figure drops to one-tenth."

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