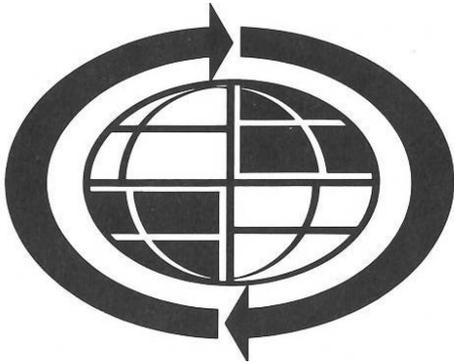


NEWS and REVIEW



COMPANION ANIMALS

Training for Standardbreds

The American Standardbred racehorse is subjected to an out-moded and frequently harmful training program, according to Tom Ivers, trainer and owner of Olympic Stable in Delaware, Ohio. The Palo Alto training system, developed in the mid-1800's by Leland Stanford, a former governor of California, rests on the assumption that trotters are born rather than made, and that their inherent ability need only be "awakened" through short mileage sprint training at an early age. Training and racing yearlings also offered the attraction of accelerated returns on breeding investments. This philosophy gained acceptance in the racing industry at a time when horses jogged the major part of a course and sprinted the final quarter. However, the style of Standardbred racing has changed to an all-out mile sprint, and under these conditions the Palo Alto regimen is, in the words of Mr. Ivers, a "guaranteed crippler."

Ivers supports his statement with racing industry data on injuries to Standardbred horses. Veterinarians attribute 70% of Standardbred racing injuries to lack of conditioning and fatigue, *i.e.*, weakness in the muscles and tendons of the lower leg. Accord-

ing to Dr. Matthew Mackay-Smith (*Equus* 21:63, 1979), both the way horses are trained and factors in the horses' form and structure determine their susceptibility to lameness. The Palo Alto system, with its emphasis on developing speed in a relatively heavy-boned horse bred for trotting, fails to build essential heart-lung and local muscle strength and endurance. The animal welfare implications are obvious: a high percentage of track breakdowns (physical injury which prevents a horse from finishing a race) and the increased pre-race administration of drugs to alleviate symptoms without really attacking their cause. [See: Legislation/Regulation.] Ivers believes that the emphasis must shift from pharmaceutical treatment of symptoms to prophylaxis by means of an appropriate training program.

Studies in exercise physiology have given rise to a training principle known as neuromotor specificity, which refers to the fact that neuromotor and biochemical changes produced by training are specific to the demands of the activity. Training for an event such as the Standardbred mile race, which incorporates speed, strength, stamina and coordination, must combine aerobic and anaerobic exercises designed to develop these different qualities. Although selective breeding plays an important role in producing animals which embody the optimum features of temperament and physique for racing, proper conditioning remains the crucial factor in ensuring that these animals reach their full athletic potential.

Mr. Ivers, in collaboration with exercise physiologist Paul Lessack of Bethlehem, Connecticut and former Ohio State track coach Frank Lubovich, has developed a training program engineered to bring both aerobic and anaerobic metabolisms to peak efficiency. Training begins with light aerobic exercise, gradually building up to cover longer distances. Long, slow workouts strengthen the heart

and local muscles, thicken the bearing surfaces of bones (thus reducing the changes of stress fractures), and increase the oxidative capacity of muscle cells. The second phase, intended to build heart-lung and local muscle endurance, combines aerobic and anaerobic exercise in a series of long, strenuous intervals punctuated by shorter periods of complete rest. The third phase consists of fast intervals at near racing speed, anaerobic workouts in which exertion demands exceed the heart's capacity to supply oxygen to the local muscles. Running on oxygen debt results in the production of lactic acid in the muscle cells, inhibiting contractions and causing fatigue, pain, soreness and often, injury. However, proper anaerobic conditioning prepares the body to handle the increased workload by raising the level of blood alkalines which in turn prevent the excessive accumulation of lactic acid in the muscle tissue. Only in the fourth and final stage, short sprints at 100% efforts, does the development of pure speed become the focus.

Ivers and his colleagues have tested this alternative training program on eight horses with previous racing injuries. After one year of testing on the training track, the horses were in condition and exhibited no behavioral or physical signs of pain or injury.

The Ivers system challenges the idea of the racehorse as 'natural athlete' and for this reason may encounter resistance from trainers who are reluctant to devote the additional time and energy this system requires. Nonetheless, as Mr. Ivers points out, breeders and owners are losing their investments whenever their horses break down on the track. Prevention of injury through appropriate conditioning and a corresponding decrease in the use of drugs may save money in the long run as well as improve the welfare of the Standardbred racehorse.

LABORATORY ANIMALS

UK Statistics on Animal Experimentation

Approximately 5.2 million live animals were used in experiments in the United Kingdom during 1978, according to the government publication *Statistics of experiments on living animals, Great Britain 1978*. This figure represents a slight drop from the reported 1977 total of 5.4 million, conforming to the pattern of fluctuation around the 5.5 million mark which began to emerge after a 1971 peak of 5.6 million.

The twenty-two tables included in the report present a detailed breakdown of experiments into categories such as type, purpose and technique(s) used. Close examination of this data reveals certain trends which may be otherwise masked by the overall figure quoted above. For example, although the number of experiments involving safety testing of cosmetics and toiletries rose 15% from 1977 (24,612) to 1978 (28,238), the largest number by far (2.9 million) continued to be devoted to the selection, development, use, etc. of medical, dental and veterinary products and appliances. The other major group of experiments (1,164,846) were directed to the study of normal or abnormal body structure and function. Interestingly, within the slight overall decline in the number of experiments concerned with neoplasia, the greatest decrease (-18% between 1977 and 1978) occurred in the category of carcinogenicity screening.

Among the 2.9 million experiments performed on live animals for medical, dental or veterinary product development, selection and study, nearly 300,000 were acute toxicity tests. Acute toxicity tests also accounted for more than half of the 88,000 experiments on the safety of industrial products, one-third of the

15,000 for household products and slightly more than one-third of the 28,000 for cosmetics and toiletries.

A comparison of the 1977 and 1978 figures on the reasons given for performing experiments indicate a decrease of 29% in medical diagnostic tests and moderate increases in safety and hazard testing required by legislation and regulations such as those from the Common Market which are now widening the range of drugs and other substances covered by the LD50 test.

Marked changes between 1977 and 1978 also appear in the distribution and prevalence of techniques used in various types of experiments. The number of medical, industrial, household and cosmetic product experiments using the Draize test, which involves the direct application of undiluted substances to an animal's eye, dropped 32% from 31,395 to 21,500 (Approximately 19,000 of these tests were performed without anesthetic.) Tests involving burning and scalding by any means dropped 61% from 6,561 to 2,551. Significant decreases can also be seen in the numbers of nonbehavioral studies entailing interference with other senses (-50%) and interference with the central nervous system (-43%). However, this trend seems to be offset by an increase in behavioral experiments using aversive stimuli (34,075; +20%) or other means (9,167; +64%) to induce psychological stress in an animal subject.

FARM ANIMALS

Hens Take to Grass

A preference test conducted over four weeks on 16 hens revealed that the type of cage floor rather than the cage size was the primary factor in choice of housing (*Brit. Vet. J.* 134:469, 1978). Birds exposed to both battery cage and hen-house/run environments were presented with con-

trasting pairs of cages in a T-maze construction. Although the birds which had been kept in (not merely exposed to) an outdoor facility displayed quicker responses to all proffered environments than their battery-caged counterparts, both sets of birds reacted faster to the same alternatives. When presented with the contrasting pairs, large/small and grass/wire, the hens chose the large cage and the grass floor, respectively. However, when size and floor type appeared in combination they chose small grass cages over large wire ones.

Preference tests which allow the animal rather than the keeper to choose between different environments sometime produce surprising results. In this case, the disadvantage of battery cages is seen to lie more in the type of interior and not so much in the degree of confinement. It follows that housing improvements designed from the vantage point of animal welfare might concentrate on better equipping presently available cages rather than on the costlier proposition of increasing space.

Sodium and Egg Production

Feeding laying hens a low sodium diet to induce a pause in egg production is gaining popularity. The purpose is either to reduce egg productivity over a short period in times of market surplus, or to prepare a flock for a second laying cycle. Earlier studies have suggested that this technique may be more humane than starvation and water deprivation to induce 'forced moulting' and that no specific behavioral problems appeared. Behavior problems such as toe and foot pecking have been reported under field conditions in birds on low sodium diets. B.O. Hughes and C.C. Whitehead, in a paper entitled "Behavioral Changes Associated with the Feeding of Low-Sodium Diets to Laying Hens" (*Appl.*

Anim. Ethol. 5: 255-266, 1979) investigated this welfare question and summarized their study by stating that:

"...A pilot experiment showed that under some circumstances damaging pecking did occur when low-sodium diets were fed, particularly so in combination with high calcium levels. Sodium-deprived birds showed an increased tendency to peck at novel objects, but did not increase their intake of sodium-supplemented diet when offered a choice.

"The problem was then investigated on a larger scale by allocating hens of 2 separately-caged strains to one of 9 treatments, housed in bright light and in groups of 6 per cage, with 3 levels of sodium and 3 of calcium. The increased calcium levels had no effect on either cannibalism or feather condition, but cannibalism was seen in birds receiving both low (0.003% Na) and intermediate (0.03% Na) levels of sodium, although not in the controls (0.13% Na). The effect was more marked in the medium hybrids than in the light hybrids. Feather condition was unaffected by sodium deprivation. It is argued that the problem is a husbandry and management one and that, in spite of these adverse effects, sodium depletion remains a useful method for inducing a pause in egg production." (p. 255)

The authors addressed the ethical question of depriving birds of an essential nutrient as follows:

"It has not yet been established how much suffering is involved when an animal is deprived of an essential nutrient but it may be substantial if the period is a long one. It is probable, how-

ever, that suffering is less in the case of sodium than in the case of calcium, for example, for three reasons. Firstly, the very weak selection response suggests that there is not very much positive post-ingestational feedback, implying that the adverse effects which are being reversed are not severe. Secondly, the birds do not lose body weight (Whitehead and Sharp, *Br. Poult. Sci.* 17:601 1976) as they do under most nutritional stresses. Thirdly, there is evidence that once they are out of egg production they go back into sodium homeostasis." (pp. 264-265)

They concluded that this method would be more acceptable from a welfare viewpoint if the birds were kept under reduced illumination in small groups of no more than four per cage.

Dairy Cow Housing Systems

Professor J.L. Albright (Purdue University) discussed the various housing needs of dairy livestock and developments in housing systems at the 1979 Farm Builders Conference in West Lafayette, Indiana. He noted that the long-term effects on livestock housed on concrete floors throughout their productive life have not yet been adequately analyzed. There is present concern over this type of environment in relation to the behavior, reproductive functions, udder health, and foot and limb structure of cattle.

Many dairymen now remove the cows from concrete, at least during their dry period. Cows have also been moved to exercise or pasture areas whenever feasible in order to rest their feet, legs and udders. Some new confinement systems employ a combination of concrete flooring and dirt lots to allow cows to be programmed off concrete for several hours each day.

Steel and concrete slatted floorings have never been totally satisfactory for dairy cows, reported Albright, and their use has decreased over the past 15 years. In a two year study at Purdue University, 32 Purdue Holsteins housed on a natural dirt base with sawdust/shavings bedding were compared with cows housed on slatted floors with permanent bedding on concrete. Those cows housed on dirt produced an average of 3 pounds more milk per day, had lower leucocyte counts during three quarters of the study, stayed cleaner, exhibited fewer cases of clinical mastitis (13 vs. 29), had fewer foot and leg injuries (5 vs. 12) and also rested easier, lying down an average of one hour more per night.

These results indicate that increased productivity and improved animal welfare can go hand in hand with conscientious management methods.

WILDLIFE

Inbreeding Mortality in Ungulates

As the world's wildlife population continues to decrease due to human encroachment and intervention, the issue of inbreeding takes on a new significance. Drs. K. Ralls, K. Brugger and J. Ballou recently completed a study at the Smithsonian Institution in Washington, D.C. on the relation between inbreeding and juvenile mortality in small populations of ungulates (*Science* 206: 1101-1003, 1979).

The researchers analyzed data primarily from records of the National Zoological Park in Washington, D.C. of 16 species of captive ungulates which recorded the number of inbred calves (all young with an inbreeding coefficient greater than zero) and noninbred calves (those young with unrelated parents) that survived six months or more. The records showed that the mortality rate in inbred young was higher in all but one of the

species reviewed. Significantly higher mortality rates were found in half of the species studied (four species with the largest sample sizes and four in which the sample size was small but the mortality of inbred young was very high). The authors admit that they did not analyze most of the data with respect to variables which might have influenced the juvenile mortality figures, except in the case of one species where factors such as birth season, management improvements, birth order and possible differences between wild and captive born females were examined and proven insignificant in their effect on the high mortality rates of the inbred young.

These findings lend credence to the claim that inbreeding within captive populations of exotics is a serious problem which often goes unrecognized when zoos fail to maintain detailed records. The authors urge that in order to preserve genetic variability in small populations of ungulates, sound genetic management programs should be instituted *prior* to the appearance of inbreeding deficiencies in individual species.