

News & Analysis

Feeder Pigs Demonstrate Stress via Radio

As part of a project designed to gain some insights into the kinds of situations which cause the most stress in pigs during a typical marketing day, agricultural engineer Herman F. Mayes of the USDA's Science and Education Administration is using a novel technique. He tapes miniature radio transmitters to the pigs' backs; the transmitters send out signals of the animals' heart beat, which are then recorded on a strip chart. These electrocardiograms show that when pigs are, for example, forced to climb a loading chute, their heart rate jumps from a resting rate of 100-160 beats per minute to 250-260. The result of this increase may be a decrease in blood flow, as the heart muscle becomes uncoordinated under the stress of a rapid beat, and a subsequent rise in body temperature. Mayes plans to make similar observations on pigs in a wide variety of stressful situations, such as those encountered in rough handling or in simply waiting for transportation with other feeder pigs, after grading and sorting. The data from these studies will be used in the design of better marketing facilities and handling procedures.

Debate in Europe Over Standards for Battery Hens

In a resolution passed in July 1980, the EEC Council of Europe expressed the general principle that laying hens kept in battery cages should be protected by minimum standards and other regulatory criteria, to ensure that these animals would be afforded some degree of protection from unnecessary suffering. After considering the many aspects that complicate this situation, such as the

need for more data on what hens actually *do* require for some sense of well-being, along with the economics of egg production within and without the EEC, the Commission of the European Communities issued several specific directives for minimum standards in August of 1981. But it seems that no two countries, or no two experts for that matter, can agree on the adequacy of the Council's proposal.

The economics of egg production in the EEC, considered alone, are complex. First of all, there is no price support system in place; market forces alone determine prices, following the laws of supply and demand. Egg producers are assisted only by a common trade system at the external boundaries of the Community, in the form of import taxes and export refunds. But advances in genetics, feeding, and hygiene and, probably most significant, the introduction of battery cages, have kept egg prices stable for consumers.

In 8 of the 10 EEC member states, more than two-thirds of all laying hens are kept in such cages. Average cage sizes range from 400-450 cm² per bird, with trough lengths of about 10 cm² per bird; numbers of tiers of cages average three to four. The current density of flocks is estimated at three to five hens per cage. The production cost of increasing standards as, for example, in minimum space per bird (to 600 cm²), has been estimated at 8-9 percent, which represents the necessary investment in new buildings and equipment.

Nonetheless, the Council, after consultation with poultry scientists, determined that the need to guarantee the welfare of the hens should be balanced against these economic costs. After discussing various aspects of the behavioral, environmental, and general welfare needs of the birds, it was decided

that standards need to be established in at least two areas: space and feeding requirements (including drinking). However, they stressed the need for further study on the relative welfare and comfort of laying hens in various production systems, and the Commission plans to support such studies over the next 2 years.

Therefore, the final document issued by the Commission in August represents, at least in principle, a compromise between economic necessities and humane concern for the comfort of the birds, given what is presently known about their needs. Specific recommendations (paraphrased here for clarity) included:

1. A minimum cage area of 500 cm² per bird (minimum total cage area, 1,600 cm²).
2. A minimum trough length of 12 cm for each hen.
3. A continuous drinking channel, also at least 12 cm long for each bird.
4. Cages must be at least 40 cm high.
5. Floors of cages must allow the hen to rest on three claws of each foot, and the slope of the floor must not exceed 7.5 degrees (14 percent).

Cages already in use are given until July 1, 1995 to comply with these requirements, but new cages must comply by July 1, 1983.

The directive also contains a second section, or "annex," that sets out several other conditions that must be met by July 1983. Governments will be required to make some attempts on random inspection of battery units; Commission members will make inspections as well. The annex also incorporates some other recommendations, but these tend to be expressed in more general language than those in the directive; for example: "Proper insulation and ventilation of the (poultry) house must ensure that air velocity, dust level, temperature, relative air humidity, and gas concentrations are kept within a range not harmful to the birds."

The whole directive, however, is to be considered only as an interim measure (in force until 1983), to help alleviate the worst conditions, until the scientific studies on the behavior, environmental needs, and health requirements of hens, as noted above, have been completed.

Yet it seems that no one is terribly pleased with the Commission's efforts. The British Farm Animal Welfare Council (FAWC), in advising the agriculture ministers on the directive, noted with alarm that only new cages would be required to comply with the directive; its members advocate immediate action to improve the welfare of all hens. FAWC also would increase the minimum square area for each bird to 600 cm², a figure that is in line with an already established British welfare code that recommends 550-600 cm². These objections were reported in October 24 *Veterinary Record*. By October 31, the next edition of the *Record* noted that debate about battery hens had reached the House of Commons. The Minister of State for Agriculture, Alick Buchanan-Smith, opted for the 600-cm² minimum, to be enforced after a reasonable transition period. He was supported by Roy Mason, who spoke, in part, for the animal welfare lobby. The most radical view was put forward by Janet Fookes (Chair of the RSPCA), who stated that, in her view, the animal lobby would settle for nothing less than a complete phase-out of the battery system.

A November 16 report in *Feedstuffs* stated that West Germany also supports the 600-cm² allotment; in Denmark, the government has already established 800 cm² as a legal minimum. Ireland and Italy accepted the proposal as submitted, while France has so far been noncommittal. Meanwhile, in Brussels, the Commission that drafted the document has decided to establish a special committee to assess the latest developments in the egg industry, in light of its recent proposals.

And so the struggle continues. The EEC debate over regulations on conditions for laying hens is far from over.

Nor is it clear that the new scientific data gained from research to be done over the next two years will clarify the situation, given the complexity of multinational economics within the EEC. A similar effort to reconcile the differences in codes pertaining to *laboratory* animals within the EEC is discussed in a Comment by Drs. Rozemond, also in this issue.

Farm Animal Research — For Producers or for the Animals?

From at least two major sources, there have been recent announcements of funding for farm animal research that focuses, to some extent, on the welfare of the *individual* animals, and not just on gross levels of production. The two funding sources are the USDA, which allocated \$380,000 for fiscal year 1981 specifically for animal care research, and the National Pork Production Council (NPPC), which has funded several studies on swine welfare over the last 2 years. These levels of funding hardly constitute a flood. But they do represent a beginning, even though the United States still lags far behind Britain and the rest of Europe in supporting animal welfare-related research.

The Chicken or the Egg?

The fascinating "story-within-a-story" here involves deciding precisely what motivated Pork Council and USDA officials to set aside money for this kind of research. Repeated questionings of USDA staff, for example, about whether it was concern for the animals, or concern for production levels, that induced them to support stress-related research brought only confident responses that these two concerns were nearly always in perfect harmony: a happy pig is a fat, healthy pig. In a press release on the new studies, which was sent out in September 1981, both animal welfare and productivity were given equal emphasis. The research will, it states:

1. "...enhance efficiency of production through a more thorough under-

standing of the effects of the environment and the ability to scientifically alter it to promote the individual animal's well-being."

2. "...provide scientifically based information to evaluate the well-being of individual animals in the present production systems environment."

Whatever one concludes about motivation, however, it is surely gratifying to see phrases about "improved well-being" of animals in press releases from USDA. And officials like Dr. D.J. Bray, Poultry Scientist for the Cooperative State Research Services, admit that the agency has definitely felt the pressure from animal welfare advocates to ameliorate conditions for farm animals. Looking beyond the dedicated \$380,000 in monies allocated for 1981, he has observed that there has been an obvious trend toward funding studies that focus on animal welfare-related issues over the last 5 years. In particular, this research has been looking at how environmental conditions, previously studied as separate items, inter-relate to influence the behavior and physical health of individual animals. For example, Dr. Bray cited his own work, a study on how differing management systems for poultry can be set up so as to minimize stress.

As another indication of the effects of animal welfare activism, Dr. Bray observed that, up until last year, the indexing words "animal welfare" were almost never used; a search of most data bases using these words would yield nothing. But, within the last year or so, the term "animal welfare" is showing up as a key word in one paper after another.

An Overview of the USDA and Pork Council Studies

The USDA is supporting research in three general areas: veal calves (2 studies), swine (3 studies), and poultry (3 studies). In addition, there is another category, termed "fundamental research," with 2 projects funded.

An examination of the study titles provides, among other things, some sense of the state-of-the-art in the development of objective measures for assess-

ing stress in animals. One difficulty in this research area, and an indicator of why more research is so urgently needed, is that we simply do not have "a simple, all-inclusive technique for determining when an animal is being stressed" (T.H. Friend, grant proposal to the NPPC, 1981). Therefore, the studies listed below tend to be, in some sense, pilot experiments, utilizing a grab-bag of behavioral and physiological parameters, so that we can begin to identify reliable, replicable indicators of animal stress, an important prerequisite in learning how to alleviate it. Specific studies funded in fiscal 1981 include:

- "Behavioral and Physiological Evaluation of the Well-Being of Chickens and Turkeys as Affected by Management and Environment"

- "Investigation of the Effect of Two Different Housing Methods on the Welfare of Laying Hens" — indicators used will include humoral and cell-mediated immune response capacities, and blood levels of minerals (calcium, zinc, copper and iron) previously implicated in the stress response

- "In vitro Bioassay Techniques for Avian FSH [follicle stimulating hormone] and ACTH [adrenocorticotrophic hormone]"

- "Assessment of Behavioral-Physiological Relationships of Laying Fowl Maintained at Various Cage Densities"

- "Behavior and Physiology of Calves in Stalls, Pens, and Hutches" — indicators will include adrenal function, plasma T3 and T4 (related to thyroid function), white blood cell counts, blood chemistry, and a range of behavioral measures

- "A Study of the Effect of Confinement and Related Factors on Physiological and Behavioral Measurements in Dairy Cattle"

- "Determining Stress in Confined Sows and Gilts" — the effects of gestation stalls and farrowing crates on the pigs' hormonal responses will be studied

- "Effects of Mixing Unfamiliar Pigs on Cortisol and Immune Function"

- "A Study on the Adaptive Responses of Confined Swine to Various

Environments" — blood hormone levels and the immune system, as well as behavioral changes, will be monitored.

The work supported by the NPPC ranges from a detailed analysis of the effects of small changes in confinement systems to a broad comparison of the differences between pigs in confinement and free-ranging pigs. Dr. Stanley Curtis of the University of Illinois is studying the differences in the stress and adaptation of gestating gilts, 25 days after mating, under sets of conditions that closely resemble each other (and the status quo) — that is, gestating pens (with individual or group feed stalls) versus gestating crates (with solid or open walks in front). By contrast, the study by Dr. T.H. Friend focuses on the relative levels of stress induced by quite different kinds of environments: namely, tethering, individual stalls, and pasturing. Dr. Friend will examine a number of parameters: adrenal hormone levels, T3 and T4 values, white blood cell counts, and behavior.

The Future for This Kind of Research

While the NPPC has indicated that it plans to continue its current level of funding for animal welfare-related work, the \$380,000 from the USDA for fiscal 1981 consists entirely of "non-repeatable" funds; none of the officials interviewed at USDA could say whether there could be any money at all earmarked for animal welfare studies in the 1982 or 1983 budgets.

But Dr. Daryl King, the National Research Program Leader of the Agricultural Research Service, notes that the agency is beginning to utilize an interesting method to circumvent the current lack of funds. Ongoing studies, not originally designed to investigate animal welfare, have been re-examined. In many cases, these studies are now being modified to include the collection of data related to stress in individual animals. In this way, a measurement of, for example, corticosteroid levels, or the recording of additional notes on behavior, can be used to give older work a new focus that is more closely related to animal welfare concerns.

Finally, some individual entrepreneurs have been considering the initiation of their own tentative studies. Provimi, the largest U.S. manufacturer of milk replacer feed for veal calves and a veal meat packer, had planned to investigate the effect of the Quantock group pen method (as compared with confinement in individual crates) on the general health and well-being of veal calves. This was the result of public feeling that the crate method is unnecessarily cruel. However, the latest word is that Provimi, having gained a respectable yield of favorable PR about the endeavor, has decided to dispense with the actual performance of the study. Therefore, Quantock Veal, of England, will soon begin the test, on its own, in the United States.