Co-ordinated field experiments with pigs have been widely used in Britain, and more recently the United States and Canada, to test the applicability of research findings to the farm situation. The results of two co-ordinated experiments conducted in New South Wales are briefly presented. The methods used are compared to those used overseas and the problems encountered are discussed.

I. INTRODUCTION

The ultimate aim of all applied animal research is the adoption of the results by the farming community. One of the factors affecting adoption is the question of the applicability of results obtained in one environment to all other environments. No matter how closely the facilities and husbandry techniques used in research units relate to commercial practice, and no matter how many times a particular result is repeated, the result is often obtained under only one environment. "Environment" includes such factors as breed and strain of pig, type (and even batch) of feed, husbandry practices, production system, climate, etc.

II. CO-ORDINATED FIELD TRIALS

Braude and his co-workers (e.g., Braude and Rowell 1957, Braude et al. 1958, 1960) recognised the problem many years ago and attempted to overcome it by developing the concept of co-ordinated field experiments. This concept was included when Braude (1962) advocated a three-stage approach in pig nutrition research

1. a "look and see test"
2. an in-depth investigation - "main test"
3. a "field test" - co-ordinated trials in the field involving a number of different centres.

The intention of the "field test" is to determine if, and how well, the results obtained in the research environment will apply under a range of practical conditions.

Co-ordinated field trials (demonstrations) have been widely used in the United Kingdom as a research technique by Braude and his colleagues under the auspices of the Agricultural Research Council. Some work has also recently been done in the United States (NCR-42 Committee on Swine Nutrition 1974) and Canada (Castell et al. 1975) under the auspices of the Canada Committee on Animal Nutrition. Fagan et al. (1961) have used the approach on a limited scale in Tasmania.

III. FIELD TESTING OF MINERAL-VITAMIN SUPPLEMENTS FOR PIGS IN NEW SOUTH WALES

Three experiments at Wollongbar showed no response by growing pigs to complex mineral-vitamin supplementation (MV) of grain/animal protein concentrate diets. A co-ordinated series of simple field trials was arranged to demonstrate the results to producers under commercial conditions.
The demonstrations were supervised locally by Departmental pig production officers. The co-operating producers fed grain/animal protein concentrate diets similar to those at Wollongbar but using the feedstuffs normally available to them. These diets were supplemented with either vitamins A and D₃ or the Wollongbar MV supplement which contained a growth promoting level of Cu. The growth responses from Wollongbar and the field demonstrations are shown in Table 1.

<table>
<thead>
<tr>
<th>Research centre</th>
<th>Field demonstrations</th>
<th>18-32 kg</th>
<th>18-53 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-32 kg</td>
<td>1 2 3 4 5 6 7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>18-53 kg</td>
<td>-2 14 13 6 5 0 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Responses in individual experiments non-significant
‡ Average response 18-32 kg significant (P < 0.01) but 18-53 kg not.

Because the field response and the variability of it were contrary to the Wollongbar results, a second series of seven co-ordinated demonstrations was arranged. Progress results suggest that the variable response may have been due to including 250 ppm Cu in the MV, and not to any of the other minerals or vitamins.

IV. COMPARISON WITH METHODS USED OVERSEAS AND LIMITATIONS ENCOUNTERED

(a) Co-operators

The British, American and Canadian workers all used institutional piggeries (at universities, agricultural research centres, agricultural colleges or experiment farms operated by commercial feed firms) as their co-operating centres. In all but one case, the co-operators in New South Wales were commercial producers, generally family enterprises. The exception was the Agricultural Research Station, Grafton which participated in the first series.

(b) Experimental Procedures

Because the overseas workers use institutional piggeries it is possible for them to impose a fairly strict measure of control on the conduct of the trials. Braude in particular is able to specify fairly strict limits on the age at starting, the balance of sexes and litters and the routine to be followed. The number of pigs per pen is left to the discretion of the co-operating centre with the constraint that there be no less than six.

We found that our experimental requirements had to be much more relaxed as we were dependent on the goodwill of the producer. They could not be disadvantaged to any great degree as they were almost exclusively family farms and could not be expected to tolerate any losses. Generally we had to fit in with the producers’ normal husbandry practices; e.g., medication, worming, etc., and type of production. Some were pork
producers which meant that some of the demonstrations could only be run up to 50 to 55 kg live weight, while in others it was possible to take the pigs right through to bacon weight where this was the normal type of production.

Numbers of pigs per treatment were also a problem. The minimum number of pigs was six, if possible balanced for sex. Even with this minimum number and only two treatments it proved difficult in some cases to get sufficient suitable pigs to start the demonstrations resulting in considerable delays. This problem was compounded in the second series which involved three treatments. At the other end of the scale, pens on many commercial units are designed so that optimum stocking density is maintained by removing pigs at different stages. Since this could not be done during the demonstrations, the number of pigs per pen had to be limited to the final stocking density. Consequently most pens were understocked at the start, some grossly so, meaning a further loss of potential income for co-operators. Occasionally it was possible to obtain sufficient numbers to fully stock the pens, though this was rare. One unalterable stipulation was that the pens used were immediately adjacent so they had as nearly as possible the same environment.

A variation in starting weight is accepted by Braude (e.g., Braude and Hosking 1974 - 14.1 to 25.7 kg) and the Canadian workers (11 to 23 kg). The NCR-42 Committee apparently do not (21.3 and 26.1 kg in two experiments). Our starting weights also varied, mainly to suit the convenience and travelling requirements of the extension officers. Some had considerable distances to travel and it was not possible to weigh pigs weekly. Consequently if it was apparent that the pigs destined for a demonstration were going to be far in excess of the desired 18 kg starting weight at the next weighing, the demonstration was commenced at a lighter weight. The reverse situation also applied.

The Canadian and U.S. groups, because of the type of institution with which they co-operate, were able to get a number of replicates at most locations. Braude and co-workers have also done this on occasion; e.g., Braude and Hosking 1974. In the local demonstrations it was impossible to obtain more than one replicate at each location because of insufficient numbers of suitable pigs being available at any one time, apart from any consideration of economy in using pen space (see above).

(c) Feeds and Mixing

In all Braude's trials only one batch of each feedstuff is used for the full trial. The diets are mixed at a central point and then distributed to the co-operating units. In the New South Wales demonstrations, the base diets were prepared from the grain and protein concentrate normally used by the producer and available at the time of the demonstration. The mineral-vitamin supplement was prepared at Wollongbar from a single batch of materials and distributed to each centre. The NCR-42 Committee used the same approach to preparing the diets but the Canadians combined elements of both - some diets for some units were prepared centrally, others were home-mixed.

(d) Feeding Rates

All the overseas efforts in co-ordinated trials have involved uniform feeding rates over all centres. The two North American groups offer feed ad lib. while Braude uses a standard scale, fed twice daily; e.g., Braude, Lyon and Rowell (1965). Feeding rates in the local demonstrations varied around that suggested, especially as regards the maximum level. In some cases the suggested maximum was too high for the strain of pigs and would have resulted in overfat carcasses and downgrading. In others it was too light to permit optimum performance.
Adjustments were thus made at the discretion of the supervising officer to minimise disadvantage to the farmer.

(e) Carcase Data

Our demonstrations are especially variable in this respect. At some centres we were able to obtain full carcase appraisals on all pigs, at others only on some pigs, at yet others only a backfat depth on the live pig. To gain some kind of uniformity we attempted to take live backfat readings on all pigs, regardless of other measurements. The overseas workers were able to collect much more detailed carcase information.

V. DISCUSSION

Despite the lack of uniformity in methods and conditions at the various centres in New South Wales, I feel our series of demonstrations are probably the better because of it. The disparities actually become an advantage. The conditions are less controlled and thus the results of the demonstrations provide an indication of how a research finding will apply to the wide range of practical conditions. The inability to replicate at each centre would appear to be a disadvantage, yet like the lack of uniformity is probably an advantage. Braude and Hosking (1974), after considering the biology and statistics of co-ordinated trials, have come out in favour of using a large number of centres with a single replication, rather than fewer centres with more replications. In this way the results of co-ordinated field demonstrations have the widest application to industry.

VI. REFERENCES