

EFFECT OF NICOTINE SULPHATE ON THE PERFORMANCE AND CARCASS QUALITY OF GROWING PIGS

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SUMMARY

Twenty-four Berkshire pigs were used in an experiment designed to assess the influence of 5 p.p.m. nicotine sulphate in their diet on their performance and carcass quality. The pigs were individually fed either a control diet, or a similar diet containing nicotine, from approximately 50 to 180 lb liveweight.

There was no indication that the inclusion of nicotine significantly influenced either rate of gain, efficiency of food conversion or any of the carcass characteristics examined.

I. INTRODUCTION

Canadian workers have reported that the carcass quality of pigs was improved when they were fed to appetite on rations containing nicotine sulphate (Cunningham and Friend 1964a). Greatest differences were observed with 5 mg/kg of nicotine sulphate in the ration. This level improved carcass dressing percentage, depth of back fat and loin fat, carcass length, carcass score, carcass protein and carcass fat. Loin eye area was improved but not to a significant extent.

Further work (Cunningham and Friend 1964b; Cunningham, personal communication) included an experiment in which 5 mg/kg of nicotine sulphate was included in a ration where intake was restricted to 2.5 kg of feed per day. The inclusion of this amount of nicotine sulphate reduced the minimum depth of fat over loin eye area tracings from 16.5 to 15 mm ($P < 0.05$).

In Queensland, factory grading standards are based on an assessment or measurement of the fat depth revealed when the carcass is split into two sides. A premium of 3 or 4 cents per lb dressed weight is paid for carcasses with a sufficiently low backfat.

The present work was designed to assess the practical value of incorporating nicotine sulphate in rations where daily intake was restricted. The work was carried out at the Hermitage Research Station, some 80 miles south-west of Brisbane.

II. MATERIALS AND METHODS

Twenty-four Berkshire pigs initially averaging 49 lb liveweight and 64 days of age were used. They were stratified in pairs according to litter of origin, liveweight and sex. Members of the pairs were then directed at random to give four pigs on each treatment in each of three pens.

The eight pigs in each pen were housed collectively but individually fed on a ration either with or without 5 p.p.m. of nicotine sulphate, supplied by a 40% solution premixed with a proportion of the barley in the ration. Mixing was carried out weekly, the product being stored in plastic bags to minimize loss of nicotine. The basal ration contained 41.75% barley meal, 41.75% wheat meal, 10.0% fish meal, 5.0% lucerne meal, 1.0% ground limestone and 0.5% salt. To each 100 lb of this mixture 10 g of zinc carbonate and 10 g of a vitamin and mineral supplement ("Nutrigain"—Nicholas Pty. Ltd.) were added. On analysis, the mixture was found to contain 9.3% moisture, 18.0% crude protein, 2.2% fat, 5.9% fibre and 4.2% ash.

Slightly moistened meal was fed in two equal daily feeds at 8 a.m. and 4 p.m. Intake was restricted according to a scale based on the liveweight of each pig at the weekly weighing. This scale provided the following amounts of air-dry meal daily:

2.3 lb from	40 to	50 lb liveweight
2.5 lb from	50 to	60 lb liveweight
3.0 lb from	60 to	70 lb liveweight
3.4 lb from	70 to	80 lb liveweight
3.7 lb from	80 to	90 lb liveweight
4.0 lb from	90 to	100 lb liveweight
4.3 lb from	100 to	110 lb liveweight
4.5 lb from	110 to	120 lb liveweight
4.8 lb from	120 to	130 lb liveweight
5.0 lb from	130 lb	liveweight, and over.

The three pens each had a concrete-floored sleeping area of 80 sq ft with a slatted-floored dunging area in the rear of the pens. Water was not available during the feeding periods but at all other times pigs had access to self-waterers positioned over the slatted areas.

The trial commenced in November 1965 and concluded in March 1966, when the last of the pigs had been consigned to a bacon factory. The average liveweight on the morning of dispatch was 181 ± 5.6 lb.

The cold dressed carcasses were appraised by the Queensland system (Bostock 1964). Measurements of the subcutaneous fat layer, including the skin thickness, were also made on the split carcass in the region of the shoulder where backfat was widest, in the region of the last rib where it was thinnest and over the middle of the exposed m. gluteus medius.

III. RESULTS

During the first 12 days of the trial several of the pigs suffered from a lack of appetite associated with body temperatures of up to 105°F. One pig being fed nicotine in the ration died on the third day; a post-mortem did not reveal the cause of death. Twelve days after the start of the trial, a pig on the control ration died and on autopsy a ruptured intestine was revealed. During the 12-day period three other pigs on the control ration and three on the ration containing nicotine were treated with injectable antibiotic and all pigs were dosed for 3 days with furazolidone. For the remainder of the trial the health of the pigs was good. There was no evidence that the presence of nicotine sulphate influenced the palatability of the ration.

A composite sample, obtained from each batch of food mixed, was analysed 2 months after the conclusion of the trial. This indicated the presence of 3 p.p.m. nicotine sulphate. In view of its volatile nature this was considered a satisfactory indication that the correct amount was fed.

Details of performance and carcass characteristics are set out in Table 1. One carcass was not available for appraisal; the missing data for this pig and for the two that died have been calculated by a standard method.

TABLE 1
DAILY GAIN, FOOD CONVERSION AND CARCASS CHARACTERISTICS OF PIGS FED A CONTROL RATION AND ONE CONTAINING 5 P.P.M. NICOTINE SULPHATE

Attribute	Control	Nicotine Sulphate	S.E. of difference
Daily gain (lb)	1.34	1.35	0.03
Food conversion	3.11	3.08	0.05
Area index of "eye" muscle (sq mm)	3,573	3,589	88.6
Backfat thickness (mm)	19.1	18.7	1.1
Body length (mm)	770	772	7.3
Appraisal score	75.2	77.1	3.8
Average backfat (shoulder, midback and loin) (mm) ..	29.5	28.8	Not analysed
Carcass dressing percentage	75.2	75.4	Not analysed
Factory grading—			
Prime	0	0	
Fat	6	4	
Overfat	5	7	

The results show that the inclusion of 5 p.p.m. nicotine sulphate had no significant influence on performance or on any of the carcass characteristics that were examined.

IV. DISCUSSION

Canadian workers obtained a greater response to nicotine sulphate under *ad lib.* feeding conditions than under conditions where intake was restricted to 2.5 kg of feed per day.

Commercial grading standards in Queensland appear to require less backfat than those operating in Canada. Since the premium paid for carcasses with a low backfat thickness is high, it is generally necessary to restrict food intake rather severely.

In the Hermitage experiment, intake was restricted throughout the growing period, and the maximum daily intake was 0.51 lb (0.23 kg) lower than under restricted feeding conditions in Canada. Thus conditions were not strictly comparable.

Under the conditions imposed, the inclusion of nicotine sulphate in a ration did not appear to be a practical way of improving carcass characteristics and in particular of reducing backfat thickness. The work did not attempt to assess the influence of nicotine in rations fed to appetite since this did not appear to be of immediate importance.

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REFERENCES

- BOSTOCK, F. (1964).—New standards for judging pig carcasses. *Qd Agric. J.* 90:46.
- CUNNINGHAM, H. M., and FRIEND, D. W. (1964a).—Effect of nicotine on nitrogen retention and fat deposition in pigs. *J. Anim. Sci.* 23:717.
- CUNNINGHAM, H. M., and FRIEND, D. W. (1964b).—Carcass and blood studies with pigs fed nicotine sulphate. *J. Anim. Sci.* 23:872 (Abstract 103).

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