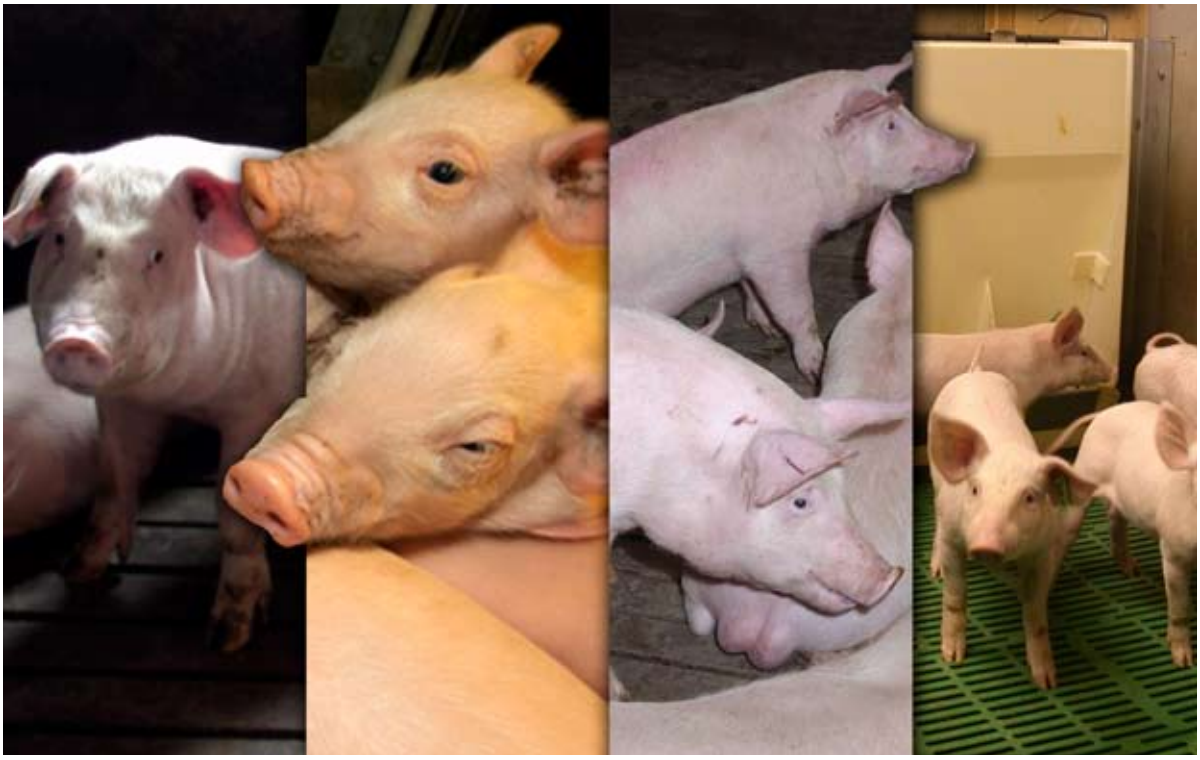
Agri-Food and Biosciences Institute

AFBI Hillsborough

The effect of the 'Jetmix' feeder on the performance of small pigs



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1. Executive summary

In a previous study the effect of feeder design on pig performance and economic efficiency was examined (Magowan and McCann, 2006). It was found that the Transition and Jetmix feeders increased feed usage but feed efficiency was poorer than when pigs were offered pellets via a dry multi-space feeder. Although similar growth rates were observed over the growing period, the use of the pellets via the dry multi-space feeder was the most economically efficient (35 p feed/kg gain) compared with the use of the Jetmix feeder. In addition, similar pig performance was attained when only the Jetmix feeder was used instead of both the Transition and Jetmix feeders as recommended by the manufacturer. The study also suggested that if small pigs were penned separately and offered feed via a Jetmix feeder, benefits may be attained. The aim of this follow-up study was to investigate the effect of the Jetmix feeder when offering feed to small pigs grouped separately from large pigs.

Small pigs (6-8 kg), in groups of 20, were offered pelleted feed via either a Jetmix or dry multi-space feeder.

Compared to the dry multi-space feeder, the use of the Jetmix feeder with small pigs increased feed usage (880 vs 766 g/day) but feed efficiency was poorer (1.62 vs 1.46). As a result there was no significant growth or economic benefit of using the Jetmix feeder compared to a dry multi-space feeder with groups of small pigs within the weight range of 6-8 kg.

The use of the Jetmix feeder increased feed usage but as feed efficiency was poorer, it is suspected that feed was wasted. Results of this study and previous work (Magowan and McCann, 2006) indicate that Jetmix feeders do not increase economic returns relative to a simple dry multi-space feeding system.

2. Introduction

When piglets are weaned they undergo dramatic changes in their environment and diet and a growth check occurs (Brooks *et al*., 2001). The use of liquid feeding and feeders that dispense feed as a ‘wet gruel’ has attracted much attention to overcome this growth check. In a previous study at the Agri-Food and Biosciences Institute, Hillsborough, the effect of newly developed feeders (Transition and Jetmix) on overcoming the growth check and improving the lifetime performance of the pig was examined (Magowan and McCann, 2006). Results from the work indicated that although feed usage increased during the growing period when feed was offered through the Transition and Jetmix feeders, feed efficiency was poorer than when pigs were offered pellets via dry multi-space feeders. Although similar growth

rates were observed over the growing period, the use of pellets via the dry multi-space feeder was found to be the most economically efficient. In addition, similar pig performance was attained when only the Jetmix feeder was used, instead of both the Transition and Jetmix feeders as recommended by the manufacturer, suggesting that the additional cost of installing a Transition feeder was not justified in terms of improved pig performance. However, the work was carried out with groups of pigs of mixed weight and it was suggested that the use of the Jetmix feeder with small pigs only may have some financial benefits, in combination with large pigs being offered feed from a dry multi-space feeder. The aim of the current study was to investigate the performance of a batch of weaned pigs when the small pigs were separated from the large pigs and offered feed via the Jetmix feeder, while the large pigs were offered feed via a dry multi-space feeder.

3. Materials and Methods

3.1 Experimental design and animals

A total of 240 ½ Tempo x ¼ Landrace x ¼ Large White pigs were weaned at four weeks of age. Small pigs were separated from the whole batch of pigs weaned and were grouped separately from large pigs (initial average weight 7.8 and 10.3 kg respectively). All pigs were grouped in pens of 20 and balanced for gender. Over six replicates the pens of pigs were randomly allocated to one of two treatments. Treatments were imposed from weaning (four weeks of age) to 10 weeks of age.

Treatment 1 = Small pigs offered feed via a Jetmix feeder
Treatment 2 = Small pigs offered feed via a dry multi-space feeder

The rest of the pigs in the batch were offered feed via a dry multi-space feeder.

The Jetmix feeder dispensed pelleted feed into a circular communal trough (diameter 42 cm, maximum depth 8 cm, width of trough at feeding place 16 cm) after which a fixed proportion of water was sprayed onto the pellets. The feeder was programmed to offer feed within fixed time intervals throughout the growing period (4-10 weeks of age). When pigs were 4 weeks of age, feed was offered for 30 minutes per hour. An alarm sounded when feed was available, however pigs had to nudge a bar above the trough area to receive feed. Feed was therefore restricted for 30 minutes per hour in order for residual feed to be cleared. This time interval was gradually decreased through the growing period according to the length of time pigs took to clear the trough. Allowance time reached a maximum of 50 minutes per hour when pigs were seven weeks old.

One Jetmix feeder and one dry multi-space feeder were used per 20 pigs. Water was offered from two bowl drinkers per 20 pigs. The dry multi-space feeder (Etra Feeders, Northern Ireland) was of traditional design with the feed hopper connected directly to the trough with an adjustable aperture to regulate feed flow. The dry multi-space feeder offered feed from four separated compartments (dimension of each compartment – 20 cm wide, 16.4 cm long and 12.5 cm deep) within the entire trough space. In the previous study by Magowan and McCann (2006) a wooden tray was placed under the feeder trough of the Jetmix feeder to catch any feed wastage, however as there was no feed left on the wooden tray to collect in the previous study, no wooden trays were placed under the feed trough of the Jetmix feeder in the present study.

Pigs were housed in combined stage 1/stage 2 accommodation (0.38 m^2/pig) with plastic slatted floors. Temperature was 28ºC on the first day of treatment which was reduced by 0.5ºC/day to 18ºC, with this temperature maintained for the rest of the treatment period. The pigs were exposed to natural lighting through windows and artificial lighting (6250 lux) during feeding. Commercial diets were offered between 4 and 8 weeks of age after which pelleted diets formulated at AFBI, Hillsborough were offered to finish.

3.2 Production performance measurements

Pigs were individually weighed and growth rates were established at 7 and 10 weeks of age. Feed intakes and water usage were also recorded at these stages. Pen average daily gains (ADG g/day), average daily feed intakes (ADFI g/day) and feed conversion ratios (FCR) were subsequently calculated. The coefficient of variation of growth rate and live weight in the growing period was also calculated.

3.3 Economic evaluation

The economic efficiency of each treatment was calculated using feed costs of (period of offering in brackets): Starter 1 (3 kg/pig in stage 1) - £550/tonne, Starter 2 (6 kg/pig in stage 1) - £420/tonne, Link (to 10 weeks of age) - £280/tonne. Returns only took into account difference in performance, i.e. growth rate, feed intake and feed conversion efficiency and did not include overheads, e.g. housing, labour, capital etc.

In order to calculate an economic return to represent commercial circumstances where the entire batch of pigs weaned need to be considered i.e. large and small pigs, the growth rate and feed efficiency of the large pigs on a dry multi-space feeder were also recorded.

3.4 Statistical Analysis

The data were analysed using Genstat, Version 6 (Lawes Agricultural Trust, 2002). The influence of treatment factors on performance parameters were analysed by analysis of variance (blocked for replicate). The within-group coefficient of variation was calculated for body live weight and growth rate by dividing within-group standard deviation values by group mean values.

4. Results

4.1 Effect of feeder type on small pig performance

When small pigs were offered feed via the Jetmix feeder they had a significantly higher ($P<0.01$) average daily feed intake and feed conversion ratio from 4-10 weeks of age (Table 1). There was no difference in average daily gain or the coefficient of variation for average daily gain or live weight. Water usage was significantly higher ($P<0.01$) when the Jetmix feeder was used.

Table 1 ***Effect of feeder type on the performance of small pigs from wean to 10 weeks of age***

		Jetmix	Multi-space	Sem	Sig
Live weight (kg)	4 wks	7.77	7.79	0.017	NS
	7 wks	14.8	14.4	0.227	NS
	10 wks	30.1	29.3	0.644	NS
Average daily feed intake (g/day)	4-7 wks	526	428	13.66	**
	7-10 wks	1227	1094	19.8	**
	4-10 wks	880	766	15.7	**
Average daily gain (g/day)	4-7 wks	349	329	10.99	NS
	7-10 wks	731	712	23.3	NS
	4-10 wks	545	525	15.3	NS
Feed conversion ratio	4-7 wks	1.51	1.31	0.026	**
	7-10 wks	1.68	1.54	0.032	*
	4-10 wks	1.62	1.46	0.023	**
Coefficient of variation for weight	4 wks	0.111	0.107	0.0030	NS
	7 wks	0.142	0.128	0.0058	NS
	10 wks	0.135	0.122	0.0079	NS
Coefficient of variation for ADG	4-7 wks	0.257	0.244	0.0262	NS
	7-10 wks	0.138	0.146	0.0101	NS
	4-10 wks	0.145	0.159	0.0139	NS
Water usage (l/day)	Wean-7 wks	3497	1914	264.2	**

4.2 Economic returns

When only small pigs were considered there was a 5 p/kg 'feed cost:weight gain' disadvantage of using the Jetmix feeder (Table 2).

Table 2 The economic return between wean and 10 weeks of age for small pigs and for the entire batch of pigs (large + small)

	Small pigs only		Small + large pigs	
	Jetmix	Multi	Small – Jetmix + large – multi	Small – multi + large - multi
Gain (kg)	22	22	23	22
Average daily feed intake (g/day)	880	766	873	815
Total feed cost/pig (£)	11.99	10.66	11.92	11.23
Feed cost/kg gain (p/kg)	54	49	52	50

Table 3 reports the overall growth performance, feed usage and efficiency of the entire batch of pigs i.e. large and small pigs, with the small pigs being offered feed via a Jetmix feeder or a dry multi-space feeder. When small pigs were offered feed through the Jetmix feeder and large pigs were offered feed through a dry multi-space feeder the average daily feed intake was significantly higher from 4-10 weeks of age ($P<0.05$ respectively). When the performance and economic return was considered for the entire batch of pigs i.e. small and large pigs there was a 2 p/kg 'feed cost:weight gain' disadvantage of using the Jetmix feeder for small pigs (Table 2).

Table 3 Performance of the entire batch of pigs (small + large) when small pigs were offered feed from either a Jetmix or a dry multi-space feeder

	Age	**Small – Jetmix + large multi**	**Small – multi + large - multi**	**Sem**	**Sig**
Live weight (kg)	4 wks	9.0	9.0	0.44	NS
	10 wks	32.0	31.3	0.74	NS
Average daily gain (g/day)	4-10 wks	560	544	9.2	NS
Average daily feed intake (g/day)	4-10 wks	873	815	18.1	*
Feed conversion ratio	4-10 wks	1.56	1.50	0.027	NS

5. Discussion

The Jetmix feeder was introduced to the market as a tool to improve the feed intake of growing pigs. This study supports the results of previous work by Magowan and McCann (2006) in that the use of the Jetmix feeder increased feed usage but feed efficiency is compromised, resulting in no significant growth performance benefit. In addition the use of the Jetmix feeder is less economical than the use of a dry multi-space feeder, furthermore the initial capital cost of the feeder is five times that of a traditional plastic dry multi-space feeder.

The Jetmix feeder offers feed in the form of a wet mash. Through the Jetmix feeder, dry pellets are dispensed over which a proportionate volume of water is sprayed. Pigs then mix the water and pellets when eating and feed is largely consumed as a wet mash with constant consistency.

It is likely that the poorer feed efficiency can be attributed to pigs wasting feed due to the design of the feeder and the feed being in the form of a wet mash.

Lawlor *et al.* (2002) offered post weaned pigs 'liquid' or 'dry' feed and found no benefit in growth performance and observed that feeding liquid feed was wasteful of feed, since unacceptable dry matter gain:feed ratios were attained. O'Connell *et al.* (2002) investigated the effect of offering post weaned pigs wet feed via different feeder designs and observed that communal feeding troughs increased aggression at the trough and feed wastage. In agreement with this work, O'Connell *et al.* (2002) also concluded that the dry multi-space feeder was the most economical feeder type compared with a circular communal feeder design which offered a wet mash in an uncontrolled manner.

6. Conclusions

1) The use of the Jetmix feeder increased feed usage.
2) However feed efficiency was poorer compared to the use of a dry multi-space feeder.
3) As a result there was no significant growth or economic benefit to using the Jetmix feeder on a group of small pigs within the weight range of 6-8 kg.

7. Acknowledgements

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