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S DurgaMVSc, Livestock Production
Management, VC&RI,
Namakkal, Tamil Nadu, India**D Anandha Prakash Singh**Professor & Head, Livestock
Farm Complex, VC&RI,
Namakkal, Tamil Nadu, India**S Ramakrishnan**Professor, Livestock Farm
Complex, VC&RI, Namakkal,
Tamil Nadu, India**S Sureshkumar**Associate Professor & Head,
Livestock Products Technology,
Oruthanadu, TANUVAS, Tamil
Nadu, India

Economics of feeding wet brewer's spent grains, dried *Moringa* leaves and rice gluten meal to large white Yorkshire pigs at grower stage

S Durga, D Anandha Prakash Singh, S Ramakrishnan and S Sureshkumar

Abstract

A biological experiment was conducted to explore the economics of Large White Yorkshire piglets fed with conventional concentrate diet incorporated with wet brewer's spent grains (T₁), *Moringa oleifera* leaves (T₂) and rice gluten meal (T₃) at 10, 10 and 5% level, respectively and conventional concentrate diet kept as control (T₄). The study was carried out using 24 weaned Large White Yorkshire piglets available at Instructional Livestock Farm Complex, Veterinary College and Research Institute, Namakkal for 120 days period. The data on feed cost, total body weight gain and feed consumed per kilogram gain during the grower period are worked out and among the treatment groups, the pigs fed with 10% wet brewer's spent grains (T₁) had registered the lowest feed cost (1683.00) followed by the conventional concentrate control diet (1812.03) and 5% rice gluten meal (1890.09). The lowest (Rupees) feed cost (72.41) per kg gain in body weight recorded in 10% wet brewer's spent grains (T₁) followed by conventional concentrate control diet (72.87) and 5% rice gluten meal (73.28). The pigs fed with 10% *Moringa oleifera* leaves (T₂) had registered the highest feed cost (85.08) per kilogram gain in body weight. The pigs fed 10% wet brewer's spent grains (T₁) had a net gain of Rs. 36.25 per pig over the control group during the grower period. Hence, it is concluded that among the treatment groups, 10% wet brewer's spent grains was considered more suitable, economical alternative protein source to the small holding farmers which can be included at grower stage.

Keywords: large white yorkshire pigs, alternate protein sources, economics

Introduction

Pigs are competing with humans and other livestock for the conventional cereals. Moreover, conventional feed resources (cereals, legumes *etc.*) for pig production are scarce and highly expensive in many parts of the world. Thus, searching for an alternative unconventional feed source that may have valuable components of animal diets is indispensable. For instance, feeding by-products from agricultural and food processing industries to pigs can be one of the alternate viable solutions.

Brewer's spent grains (BSG) are available at low or no cost throughout the year and are produced in large quantities not only by large but also small breweries. Brewer's spent grain was found to be a satisfactory source of energy in pigs and poultry rations (Yeong, 2000; Truinin, 2001 and Madubuike *et al.*, 2004) [12, 11, 4]. Spent grain has often been used for duck, guinea fowl and pig production by small-holder farmers (Ahaotu *et al.*, 2013 and Chukwu *et al.*, 2013) [1-2].

The cost of feeding is the major factor hindering the development of pig farming. The use of forage resources as pig feeds does have several drawbacks including low digestibility of forage owing to their high fibre content, presence of anti-nutritive compounds and lack of suitable conservation methods. However, compared to cereals, they have distinct advantages justifying their use by farmers: low cost, non-competitiveness with human food, high levels of protein, minerals and vitamins. As feed is the most critical expense in pig rearing activity, it can be profitable to substitute a significant part of a concentrate based diet with some forage ingredients (Kaensombath *et al.*, 2013).

Rice gluten meal is the dried residue from rice after the removal of starch and separation of the bran by the process employed in wet milling manufacture of +rice starch or syrup or glucose. Rice gluten meal has an above average essential amino acid profile, added vitamins and high protein content. Thus it is an excellent option for animal feeds for reducing ration cost by replacing portions of expensive soya bean meal, groundnut oilcake and is also ideal for livestock having corn and wheat allergies. Rice gluten meal has a higher biological value than wheat gluten and corn gluten because of its low cost and better results.

Correspondence**S Durga**MVSc, Livestock Production
Management, VC&RI,
Namakkal, Tamil Nadu, India

Materials and Methods

A biological experiment was conducted to evaluate the economics of Large White Yorkshire piglets fed with conventional concentrate diet incorporated with wet brewer's spent grains (WBSG), dried *Moringa oleifera* leaves (MOL) and rice gluten meal (RGM). The weaner piglets available in the Instructional Livestock Farm Complex, Veterinary College and Research Institute, Namakkal were utilized for the study. A total of 24 LWY piglets at the age of three and half months old were selected and grouped into 4, each treatment comprised of 6 animals. The house is well ventilated and provided with concrete floor, feeder and waterer facility. At the start of the trial, 3 piglets per pen totally 24 piglets were accommodated in the shed. Wet Brewer's spent grains and rice gluten meal were purchased from the market and incorporated in the conventional concentrate diet at 10% and 5% inclusion level, respectively. *Moringa oleifera* leaves were collected and shade dried and the dried leaves were incorporated in the feed at 10% inclusion level. Known quantities of diets (restricted feeding) were offered twice daily in the morning and evening and the left over feed was collected and weighed daily before each feeding. *Ad libitum* potable water supply was made available. Wet brewer's spent grains and *Moringa oleifera* leaves used in this study were analysed for the presence of multiple mycotoxins (Aflatoxin – B1, B2, G1 and G2, Ochratoxin, T-2 toxin, Citrinin and Zearalenone) and revealed absence of mycotoxins. After 120 days of trial cost of production was calculated.

Results

The data on feed cost, total body weight gain and feed consumed per kilogram gain, cost of production on feed basis, net gain per pig over control during the grower period are worked out and are furnished in Table . The total feed cost (Rupees) incurred per pig during the grower period for 10% wet brewer's spent grains (T1), 10% *Moringa oleifera* leaves (T2), 5% rice gluten meal (T3) and conventional concentrate control diet (T4) groups were 1683.00, 1976.65, 1890.09 and 1812.03, respectively. Among the treatment groups, the pigs fed with 10% wet brewer's spent grains (T1) had registered the lowest feed cost (1683.00) followed by the conventional concentrate control diet (1812.03) and 5% rice gluten meal (1890.09). The pigs fed with 10% *Moringa oleifera* leaves (T2) recorded the highest total feed cost (1976.65) per pig during the grower period. The lowest (Rupees) feed cost (72.41) per kg gain in body weight recorded in 10% wet brewer's spent grains (T1) followed by conventional concentrate control diet (72.87) and 10% rice gluten meal (73.28). The pigs fed with 10% *Moringa oleifera* leaves (T2) had registered the highest feed cost (85.08) per kilogram gain in body weight.

The pigs fed with 10% wet brewer's spent grains (T1) had a net gain of Rs. 36.25 per pig (Table 1) over the control group during the grower period whereas the pigs fed with 5% rice gluten meal (T3) and 10% *Moringa oleifera* leaves (T2) showed a loss of Rs. 48.74 and Rs. 227.89 per pig over the control.

Table 1: Cost of production of pigs fed with WBSG, Moringa leaves and Rice gluten meal during grower period

Sl. No	Particulars	T ₁ (10%WBSG)	T ₂ (10%MOL)	T ₃ (5% RGM)	T ₄ (Control)
1	Number of pigs per group	6	6	6	6
2	Total initial body weight (kg) of the group	147.80	147.60	147.25	147.30
3	Total final body weight (kg) of the group	287.25	287.00	302.00	296.50
4	Total body weight gain (kg) by the group	139.45	139.40	154.75	149.20
5	Total feed consumed (kg) by the group	477.90	460.40	477.90	477.90
6	Feed cost per kg (Rs.)	21.13	25.76	23.73	22.75
7	Total feed cost (Rs.) per group	10098.03	11859.90	11340.57	10872.23
8	Total feed cost (Rs.) per pig	1683.00	1976.65	1890.09	1812.03
9	Feed cost per kg gain (Rs.)	72.41	85.08	73.28	72.87
10	Feed conversion ratio	2.79	2.73	2.63	2.66
11	Cost of production on feed basis (Rs.) (FCR x Cost of feed per kg)	58.95	70.32	62.40	60.51
12	Net gain per kg production over control (Rs.)	+1.56	-9.81	-1.89	-
13	Net gain per pig over control (Rs.)	+36.25	-227.89	-48.74	-

Discussion

During the grower period the pigs fed with 10% wet brewer's spent grains had reduced (Table 1) feed cost per kg (21.13 versus 22.75) and total feed cost (Rupees) per pig (1683 versus 1812) and feed cost per kg weight gain (72.41 versus 72.87) as compared to conventional concentrate control pigs. The pig fed with 10% wet brewer's spent grains recorded positive (Rs. 36.25) net gain per pig over control during the grower period. Similar results were reported by Amaefule *et al.* (2006) who observed reduced feed cost per kg, total feed cost and feed cost per kg weight gain in pigs fed with dried brewer's grains at 0, 30, 35 and 40% inclusion compared to control. Ngodigha *et al.* (1994) [8] also observed similar cost effectiveness upto 20% level of brewer's dried grain inclusion in growing pig diets without affecting performance whereas Enwerem *et al.* (2013) [3] found best economic return in pigs fed with upto 30 per cent level of brewer's spent grains as a replacement for fish meal.

The pigs fed with 10% *Moringa oleifera* leaves had higher feed cost per kg gain (Rs. 85.08 versus 72.87) compared to control and also showed a loss of Rs. 227.89 in net gain per pig over control. This may be attributable to the high tannin content (Moyo *et al.*, 2011; Makkar and Becker, 1997) [6, 5] reported to cause a depression in growth rate (Mukumbo *et al.*, 2014) [7] resulted in poor weight gain which in turn caused higher feed cost per kg gain. But, Oduro-Owusu *et al.*, (2015) [9] studied the *Moringa oleifera* leaves inclusion at 0, 1.0, 2.5, 3.5 and 5.0 per cent level in grower pig diet and observed that the feed Cost per kg gain was reduced as the Moringa leaves inclusion increased and the total feed cost also decreased. The pigs fed with 5% rice gluten meal had higher feed cost per kg gain (Rs. 73.28 versus 72.87) as compared to control and also showed a negative (Rs. 48.74) net gain per pig over control. Whereas, Rohit Kumar *et al.* (2016) [10] reported lower feed cost per kg live weight gain in dairy calves while replacing groundnut oilcake at 0, 50 and 75 per cent inclusion level.

Conclusion

The pigs fed with 10% wet brewer's spent grains had a net gain of Rs. 36.25 per pig over the control group during the grower period whereas the pigs fed with 5% rice gluten meal and 10% *Moringa oleifera* leaves showed a loss of Rs. 48.74 and Rs. 227.89 per pig over the control. Among the treatment groups, 10% wet brewer's spent grains was considered more suitable, economical alternative protein source which can be included in grower pigs ration to lower the cost of production.

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