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Sachin Tripura
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Shyama K
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Ally K
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Ajith KS
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Usha AP
Centre for Pig Production and Research, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Sunanda C
Department of Statistics, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Pookode, Wayanad, Kerala, India

Kekhrietsolie Keyho
Centre for Pig Production and Research, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Asgar Ud Deen
Division of Animal Nutrition, ICAR-National Dairy Research Institute (Deemed University), Karnal, Haryana, India

S Vijaya Raghavendran
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Sanoodh Mohammed AV
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Correspondence
Sachin Tripura
Department of Animal Nutrition, College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Mannuthy, Thrissur, Kerala, India

Replacement of maize with cooked barley and spent grapes in ration of Large White Yorkshire sows and its effects on litter size and litter weight

Sachin Tripura, Shyama K, Ally K, Ajith KS, Usha AP, Sunanda C, Kekhrietsolie Keyho, Asgar Ud Deen, S Vijaya Raghavendran and Sanoodh Mohammed AV

Abstract
An experimental study of 21 days was conducted with the objective to study the effect of replacement of maize with cooked barley and spent grapes in ration of Large White Yorkshire (LWY) pregnant sows (n=15) up to furrowing. The pregnant sows (three weeks prior to the expected date of farrowing) were randomly allotted to three (5×3) dietary treatments based on their body weight. In T1 group, the ration of the animals comprised of; Yellow maize, Soybean meal, Salt, Mineral mixture and Calcite. The same ration was fed to T2 group, however 25% of maize in control group ration was replaced with cooked barley, likewise in T3 (25 percent maize in control ration replaced with spent grapes). The ration of all the treatment groups was iso-nitrogenous and iso-caloric (18 per cent CP and 3265 Kcal/kg ME). Data on litter size at birth and litter weight at birth were recorded from all animals. The results of the study revealed similar average body weight in all the three dietary treatment groups (11.20, 10.60 and 9.60 in T1, T2 and T3 respectively) and similar average litter weight at birth (1.35, 1.45 and 1.46 kg in T1, T2 and T3 respectively). It is therefore concluded that cooked barley and spent grapes can effectively be used as an alternate feed resource partially replacing maize in the diet of LWY pregnant sows without affecting their performance.

Keywords: Cooked barley, spent grapes, maize, pregnant sows, litter size, litter weight

1. Introduction
Pig production, like other livestock species has a high potential to contribute to better economic gain. Compared to other livestock species, pig rearing is considered to be more beneficial due to its low investment for farming, quick returns, higher fecundity, better feed conversion efficiency, early maturity, short generation interval and relatively small space requirement. In commercial swine farming feed is expensive, contributing 75 percent of the total cost of production. The energy component contributes major portion of this cost, thus making it more dietary important (Nyachoti *et al*., 2004) [3]. As per reports of Dafwang *et al*. (2001) [1] non-conventional feedstuffs could be considered as the best alternative to produce cheaper feed and ultimately lower the cost of meat and other animal products. Many of the Non-Conventional Feed Resources (NCFR) which were designated as wastes could be utilized and converted by animals into valuable products for human benefit to alleviate the problem of existing limited feed resources (Vasta *et al*., 2008) [6].
The lower availability and increasing price of maize, necessitate an alternative energy source for incorporation in the swine feed. For economic swine production, potentially cost effective alternate energy sources are often tried. Alternate ingredients such as cooked barley and spent grapes are available in plenty as byproducts of Ayurvedic pharmaceuticals in Kerala. Hence this study was conducted with the aim of evaluating the litter size and litter weight in Large White Yorkshire (LWY) sows at furrowing by partially replacing maize with cooked barley and spent grapes.

2. Materials and Methods
The present study was conducted at Centre for Pig Production and Research, Mannuthy, Kerala. Fifteen LWY pregnant sows three weeks prior to the expected date of farrowing were selected for the experimental study.

The experiment was conducted following standard operating guidelines of the Institutional Animal Ethics Committee (IAEC), College of Veterinary and Animal Sciences, Kerala Veterinary & Animal Sciences University, Thrissur, Kerala, India. The pregnant sows were divided into three groups of five each and randomly allotted to three dietary treatments based on their body weight. T1 group was fed a ration comprised of; Yellow maize, Soybean meal, Salt, Mineral mixture and Calcite, T2 group (ration containing cooked barley; replacing 25 percent of maize in control ration) and T3 (ration containing spent grapes; replacing 25 percent of maize in control ration). The ration of all the treatment groups was iso-nitrogenous and iso-caloric (18 per cent CP and 3265 Kcal/kg ME as per NRC, 2012). All pregnant sows were maintained under uniform farm management conditions throughout the experimental period of 21 days. Composition of feed ingredients of the three dietary treatment groups are presented in Table 1. Data on litter size and weight at birth, were recorded throughout the experimental period. Data collected on various parameters were statistically analysed by Analysis of Variance (ANOVA) method as described by Snedecor and Cohran (1994) [5]. Means were compared by Duncan Multiple Range Test (DMRT) using Statistical Package for Social Studies software (Version 24).

Table 1: Ingredient composition of experimental rations

Ingredients, %	Treatments		
	T1	T2	T3
Yellow maize	71	55.5	55
Soya bean meal	27	24	28
Cooked barley	-	18.5	-
Spent grapes	-	-	15
Salt	0.5	0.5	0.5
Mineral mixture	1.5	1.5	1.5
Total	100	100	100
To the above mixture following ingredient was added			
Calcite (gm)	1.6	1.6	1.6

3. Results and Discussion

Data pertaining to litter size and litter weight at birth of sows in the three treatment groups are presented in Table 2 and Figure 1. The average litter weight at birth were 1.35, 1.45, 1.46 kg respectively in T1, T2 and T3 groups. These results are in contrast to study of Maupertuis *et al.* (2017) [2] who reported the proportion of total piglets born heavier at birth (> 1250 g) was higher (60 vs. 50 per cent) for sows receiving the grape pulp diet (supplemented with 10 per cent grape pulp) than the control diet. The similar litter size and litter weight among treatment groups in the present study might be due to isonitrogenous and isocaloric rations in all the treatment groups. Average litter size at birth of piglets of the sows fed the three rations were 11.20, 10.60 and 9.60 in T1, T2 and T3 respectively. The statistical analysis of the data revealed no significant difference among the treatments with respect to litter size and weight at birth.

Table 2: Litter size and weight of pregnant sows maintained on three dietary treatments

Parameters	Treatments[1]			P value
	T1	T2	T3	
Litter size at birth	11.20±1.24	10.60±0.68	9.60±0.81	0.50^{ns}
Litter weight at birth, kg	1.35±0.09	1.45±0.17	1.46±0.07	0.74 ^{ns}

[1]Mean of five values with SE
ns- Non-significant (P>0.05)

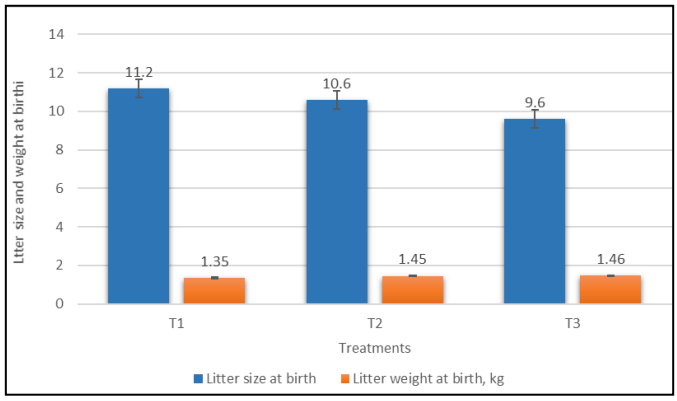

Fig 1: Average litter size and weight at birth maintained on three dietary treatments

4. Conclusion

Results obtained in the current experiment indicates that replacement of maize with cooked barley and spent grapes in ration of pregnant sows does not alter the litter size and litter weight at birth in treatment groups in comparison to control. Hence cooked barley and spent grapes can effectively be used as an alternate energy source partially replacing maize in the diet of LWY pregnant sows without affecting their performance**.**

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