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Effect of high-energy diets on live weight change in sow *

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Abstract

An experiment was carried out on Large White Yorkshire sows for a duration of 63 days at the Centre of Pig Production and Research, Mannuthy to elucidate the impact of higher feed energy levels through corn oil supplementation. Eighteen Large White Yorkshire pregnant sows were selected three weeks before the anticipated date of parturition and were divided into three uniform groups of six each and were allocated the treatments, T1{(Control ration (18% CP and 3280 kcal/kg ME as per ICAR, 2013)},T2{(Control ration +1 % Corn oil (w/w) (18 % CP and 3365 kcal ME/ kg feed)} and T3 {(Control ration + 2 % Corn oil (w/w) (18% CP and 3450 kcal ME/kg feed)}. The dry matter intake of the sows of the three groups was similar (p>0.05). At 42 days of lactation, the lactational loss in body weight of sows was statistically similar (p>0.05).

Keywords: *pregnant sows, lactating sows, corn oil, dietary energy*

In sows, dietary energy has a decisive role to play especially during gestation and lactation. It aids in foetal and maternal membrane development and is also deposited as lipids in maternal tissue, which will be mobilized later on during lactation. Adequate feed intake and body condition during gestation can reduce lactational body weight loss in sows (Schenkel *et al.,* 2010). Excessive mobilization of maternal tissue during lactation can result in extreme weight loss in sows and subsequent reproductive complications (Quensel *et al.,* 2008). Supplementation of extra energy during gestation has been reported to counter extreme lactational body weight loss and back fat reduction in sows (Wang *et al.,* 2016). Many lipid sources including vegetable oils and animal fats have been used in sows as feed supplements. Only few studies have been done with corn oil as an

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energy supplement in sow diet due to its high polyunsaturated fatty acid content. Taking into account, to its high digestibility and high content of antioxidants, carotenoids and conjugated linoleic acid, corn oil was studied with a view to evaluate its effect on feed intake and body weight of pregnant and lactating sows.

Eighteen Large White Yorkshire pregnant sows from the Centre for Pig Production and Research, Mannuthy were selected three weeks prior to their expected date of farrowing. The sows were divided into three groups of six each as uniformly as possible with regard to body weight (204.65 kg) and parity (first and second). They were dewormed with ivermectin suspension through feed before the start of the experiment. All the animals were housed under uniform management conditions and were fed twice daily. The animals were offered feed for one hour and the residual feed, if any, was collected and weighed daily and the moisture content was analysed to calculate the dry matter intake.

The feeding trial was done on pregnant sows selected three weeks prior to farrowing and extended till the 42nd day of weaning of piglets. The three dietary treatments were formulated as per ICAR, 2013, as follows:

T1- Control ration (Ingredient composition as per Table 1) (18% CP and 3280 kcal ME/kg feed)

T2- Control ration + 1 % corn oil (w/w) (18 % CP and 3365 kcal ME/kg feed)

T3- Control ration + 2 % corn oil (w/w) (18% CP and 3450 kcal ME/kg feed)

The sows of each group were fed with the corresponding treatment ration. A record of the daily feed intake of the animal was maintained throughout the experiment. Residue feed was collected, weighed and was analysed for moisture estimation. Body weights of the sows were recorded at the beginning of the experiment and thereafter at fortnightly intervals. Data collected on various parameters were analysed by Analysis of Variance (ANOVA) (Snedecor and Cochran, 1994).

The weekly feed intake and fortnightly body weight of the sows kept on the three diets are listed in Tables 2 and 3, respectively.

The initial and final dry matter intake (kg/d) of the sows kept on T1, T2 and T3 were 3.67, 3.57, 3.81 and 4.03, 4.12, 4.29, respectively. There was no significant difference ($p>0.05$) between sows of the three groups with respect to dry matter intake during the experimental period. Similar results were reported by Quiniou *et al.*, (2008), whereas the feed intake was lowered with higher energy concentrations as suggested by reports of Prunier *et al.* (2001) and Jin *et al.* (2016). Increased feed intake observed with higher energy concentration was reported by Rosero *et al.,* (2012). In the present study, the dry matter intake was not affected probably due to the restricted feeding practised. This agrees with results reported by Sulabo *et al.* (2010) who compared *ad libitum* and restricted feeding in sows fed on high-energy diets.

Table 1. Ingredient composition of control ration, %

Ingredients, %	Control ration
Yellow maize	71
Soya bean meal	25
Fat	2
Salt	0.5
Mineral mixture	1.5
Total	100
Nicomix AB2D3[1]	25 gm
Nicomix BE[2]	25 gm
Zinc oxide[3]	45 gm
Oxylock antioxidant[4]	10 gm
Nicomix AB2D3[1]	25 gm

[1]Nicomix A, B2, D3, (Nicholas Piramal India Ltd, Mumbai) containing Vitamin A- 82,500 IU, Vitamin B_2- 50 mg, Vitamin D_3- 12000 IU and Vitamin K-10 mg per gram

[2]Nicomix BE (Nicholas Piramal India Ltd, Mumbai) containing vitamin B_1-4 mg, Vitamin B_6-8 mg, Vitamin B_{12}- 40 mg, Niacin – 60 mg, Calcium pantothenate-40 mg and Vitamin E- 40 mg per gram.

[3]Zinc oxide (Nice Chemicals Pvt. Ltd., Kochi) containing 81.38 % Zn

[4]Oxylock antioxidant (Vetline Ltd., Indore) contains Ethoxyquin, Butylated Hydroxy Toluene (BHT), Chelators and Surfactatant.

Table 2. Weekly average feed intake of sows maintained on the three experimental rations on dry matter basis, kg.

Weekly	Treatments[1]			SEM value	p-value
	T1	T2	T3		
1	3.67±0.21	3.57±0.18	3.81±0.22	0.115	0.703[ns]
2	3.41±0.16	3.91±0.25	3.61±0.33	0.115	0.400[ns]
3	3.09±0.26	3.12±0.51	3.37±0.32	0.208	0.856[ns]
4	1.85±0.16	2.05±0.26	2.06±0.13	0.107	0.695[ns]
5	2.56±0.27	2.88±0.22	2.50±0.30	0.151	0.572[ns]
6	2.75±0.43	2.87±0.19	3.05±0.34	0.184	0.817[ns]
7	3.25±0.49	3.29±0.32	3.69±0.31	0.214	0.680[ns]
8	3.74±0.38	3.73±0.14	3.98±0.10	0.133	0.717[ns]
9	4.03±0.24	4.12±0.17	4.29±0.19	0.114	0.650[ns]

[1]Mean of six values with SE

ns- Non significant (p>0.05)

Table 3. Fortnightly average body weight of sows maintained on three experimental rations, kg

Days	Treatments[1]			SEM value	p-value
	T1	T2	T3		
21 days before farrowing	202.33±12.08	202.51±10.99	209.12±16.86	7.388	0.922[ns]
7 days before farrowing	216.38±13.33	231.52±10.78	229.7±16.58	7.644	0.703[ns]
At farrowing	194.18±11.43	210.05±10.13	210.55±17.21	7.437	0.621[ns]
14 days after farrowing	184.53±13.85	198.43±9.58	196.58±16.87	7.61	0.744[ns]
28 days after farrowing	178.26±15.85	198.18±8.63	193.12±17.04	8.036	0.603[ns]
42 days after farrowing	175.08±15.59	195.39±11.59	190.65±17.02	8.357	0.612[ns]

[1]Mean of six values with SE

ns- Non significant (p >0.05)

The initial and final average body weight (kg) of the sows fed T1, T2 and T3 were 202.33, 202.51, 209.12 and 175.08, 195.39, 190.65, respectively. There was no significant difference (p>0.05) among the sows of the three groups with respect to body weight during the experimental period. When compared with the body weight of sows at farrowing, the average loss of body weight ranged from 10-14 kg. But, there was no significant difference (p>0.05) among the groups at 14 days after farrowing. At 28 days of farrowing the average loss of body weight ranged from 12-17 kg. At 42 days after farrowing the loss of body weight ranged from 15-20 kg when compared with the farrowing body weight. Although there was no statistically significant difference (p>0.05) among the groups at 42 days of farrowing, an increasing trend in body weight was noticed in both energy supplemented groups T2 and T3. The results during the lactation period were in agreement with the reports of Long *et al.,* (2010), Jin *et al*., (2016) and Rosero *et al.,* (2012), who observed that sows fed with high-energy diet gained significantly more body weight and back fat during gestation whereas the body weight loss during suckling was not significantly affected.

Reports by Wang *et al*., (2016) and Cabezon *et al*., (2016) indicated that there were better gestational body weights and lesser lactational weight loss in sows supplemented with high-energy diets.

In the present study, the lactational weight loss was not different among the groups. Renaudeau and Noblet (2001), suggested that high-energy diets provide lipids to be transferred to lacteal glands and resulted in milk with a high lipid content and hence lactational loss was not affected.

The dry matter intake of sows of the three groups was similar which indicated that high-energy diets had no effect on feed intake. At 42 days of lactation, the body weight of sows in the high-energy supplemented groups was numerically better; however, the lactational loss in body weight of sows was statistically similar.

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