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Growth performance of Large White Yorkshire piglets through dietary supplementation of Shatavari (*Asparagus racemosus*) root powder

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ABSTRACT

An experiment was conducted with 18 pure breed large white Yorkshire sows to investigate the effect of ground root powder of shatavari (*Asparagus racemosus*) on the performance of piglets till 4th week postpartum (weaning). All the 18 sows were of 1st to 4th parity and were divided into 3 groups (T_1, T_2 and control) comprising of 6 sows in each group respectively. Sows in control group were fed with basal diet (As per NRC 1998) while, sows in T_1 and T_2 were subjected to shatavari supplementation @ 100 mg and 200 mg/kg body weight respectively, from day 84 of gestation till 4th week postpartum. From the present study it can be concluded that dietary supplementation of shatavari showed a significant result in the treatment groups in the 4th week postpartum. Moreover, it also reduced the disease occurrence in the treatment groups as compared to the control.

Keywords: Feeding, Growth Performance, Large White Yorkshire sow, Piglets, Shatavari plant root

Pig rearing plays an important role in the socio-economic improvement of peasant farmers in India. It acts as a source of income, employment generation and livelihood security mainly to the tribal population of the north eastern region of the country (Tasso *et al.* 2017). Although, piggery sector has a great potentiality in this region but many times it has to address different challenges and constraints (Kakati *et al.* 2019). The profitability of piggery sector largely depends on the survival of piglets/ litters up to weaning besides other closely related factors such as litter size and weight of piglets at birth (Roy *et al.* 2014). Low birth weight of piglets, poor milk yields of sow, disease occurrence during first 2–3 weeks after birth are some of the major problems faced by the farmers. Mastitis Metritis Agalactia (MMA) syndrome often predisposes the young piglets to many infections and death (Gelder and Bilkei 2005). To offset these problems, commonly the veterinarians and the pig raisers follow antibiotics and hormonal preparations which might eventually leads to antibiotic resistance and other productive disorders like growth retardation, cystic ovary, hypothyroidism, repeat breeding, loss of libido, etc. Moreover, with the growing concern about food safety, demand of residue free meat is increasing day by day. Due to these reasons, the livestock raiser as well as the veterinarians often switch to traditional medicinal herbs and its roots for piggery and other livestock production.

Use of medicinal herbs and its roots has been practiced in India since time immemorial with great success and *Asparagus racemosus* is one of those traditional medicine which is commonly used by the human beings for many purposes. It's medicinal uses have been reported in the Indian Pharmacopoeias and British Pharmacopoeias and also in traditional system of medicine such as Ayurveda, Unani and Siddha. Due to its remarkable pharmacological activity, in Ayurveda Sastra, it is known as the 'Queen of herbs' (Goel *et al.* 2006, Chawla *et al.* 2011 and Ali *et al.* 2018). Besides, *Asparagus racemosus* has been scientifically validated as reproductive system tonic, immune-modulator, antioxidant, growth promoter and anti-stress (Pandey *et al.* 2005, Kumar *et al.* 2008, Kumar *et al.* 2010 and Kumar *et al.* 2019). Use of Shatavari is well documented in dairy animals and poultry; however no literatures are available on pig. Considering the above facts the present study has been undertaken to explore the effects of dietary supplementation of Shatavari (*Asparagus racemosus*) root powder (Figs 1, 2 and 3) on the growth performance of Large White Yorkshire piglets.

MATERIALS AND METHODS

The study was carried out in the Pig Units of the Instructional Livestock Farm Complex, created under the Department of Biotechnology funded research project entitled Techno-Economic Empowerment of Rural Women through Sustainable Piglet Production Units in Aizawl District of Mizoram', Department of Livestock Production and Management, College of Veterinary Science and Animal

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Fig. 1. Shatavari plant.

Fig. 2. Shatavari root.

Fig. 3. Shatavari root powder.

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Selection of animals: Eighteen pure bred Large White Yorkshire sows (1st to 4th parity) were selected for the investigation. Further, they were divided into three groups comprising six sows in each group namely- Treatment 1 (T_1), Treatment 2 (T_2) and control in such a way that effect of parity and sire is nullified. All the experimental animals were fed standard gestation rations from day 84 to 4th week post-partum (NRC 1998) incorporating conventional feed ingredients. Feed containing dried powder of Shatavari (*Asparagus racemosus*) were fed to the gestating sow @100 mg/kg body weight/day for T_1 group and @ 200 mg/kg body weight/day for T_2 group. The sows in the control group were fed standard gestation rations without addition of shatavari (*Asparagus racemosus*). Parameters such as birth weight, average daily gain and occurrence of diseases in the piglet were studied. Data were analyzed using IBM SPSS version 20.

Management of the animals: Gestating sows were reared in individual gestation stall made up of cement concrete floor and galvanized iron crate with dimension of 0.55 m × 2.25 m. One week before the expected date of farrowing, pregnant sows were shifted to farrowing pen. Farrowing pens were constructed on raised platform and manure pit was constructed below the farrowing pen. Polypropylene slates were used as flooring material to keep the pen dry and clean. Sows during lactation were kept confined in farrowing crate placed in the middle of the farrowing pen (1.3 m × 2.25 m). Creep area inside the farrowing pens was fitted with electric heating plate over the floor and infrared heating lamps were fitted on top, for proper brooding of young piglets. Lactating sows along with their litter were reared in the individual farrowing pen till weaning (day 28 of lactation).

All the sows were dewormed in the morning on day 102nd of pregnancy with Fentas Plus-Fenbedazole (Intas Pharma) with dose rate of 5 mg/kg body weight. Whenever diarrhoea was observed in the piglets, *Diardon bolus*-Metronidazole and Furazolidone) (Vets Farma Ltd.) was given orally. In uncured piglets, higher group of antibiotics Flobac SA at the dose rate of 3 ml/40 kg body weight (Intaspharma) was injected.

RESULTS AND DISCUSSION

The weekly mean (±SE) body weight (kg) of piglets from birth to 4th week, average daily gain (ADG in gram) of piglets during 1st to 4th week and overall ADG of piglets from birth to day 28 of age for T_1, T_2 and control groups are shown in Table 1 and 2. Statistical analysis revealed non-significant differences in piglets' body weight and ADG till 3rd week but showed significant ($p<0.05$) result in the 4th week among the different groups. Numerical superiority can also be observed in case of body weight (in kg) and ADG of piglets in the treatment groups when compared to the control group. The differences in body weight growth and ADG recorded in the present study can be attributed to Shatavari supplementation, feeding and other managemental practices. The tuberous root of Shatavari (*Asparagus racemosus*) is well known for its galactogogue and anabolic activity and it appears in many Ayurvedic preparations as growth promoter and immunity-stimulant. It helps to increase the milk production (Tanwar *et al*. 2008 and Sukanya *et al*. 2014) and thereby the piglet receives enough milk for their growth and development. Rekhate *et al*. 2004, Patel *et al*. 2016 and Kumar *et al*. 2019 had also reported Shatavari supplementation as an efficient and effective growth promoter in livestock and poultry.

Out of the 194 piglets born alive, 17 died (mortality rate-8.76%) during the experiment period (from birth to 4th week) with mortality rate (%) of 7.67, 7.74 and 12.21 under T_1 and T_2 and control groups respectively (Table 3). Statistical analysis revealed non-significant differences in mortality rate of piglets under different groups**.** However, the rate of mortality was less in both treatment groups when

Table 1. Average (Mean±SE) body weight of piglets from day of birth till weaning (28 days) under different treatment and control groups

Age	Group			F-value	p value
	T_1	T_2	Control		
Day 0 (at birth)	1.17± 0.02	1.23± 0.03	1.16± 0.02	1.47 NS	0.16
Day 7 (1st week)	2.15± 0.05	2.27± 0.06	2.09± 0.05	1.20 NS	0.25
Day14 (2nd week)	3.33± 0.10	3.41± 0.13	3.22± 0.10	0.71 NS	0.52
Day21 (3rd week)	4.59± 0.11	4.67± 0.14	4.42± 0.11	0.98 NS	0.41
Day 28 (4th week)	6.11± 0.15	6.90± 0.18	5.31± 0.17	0.53*	0.04

NS, Non-significant; *, Significant.

Table. 2 Weekly average (Mean±SE) daily gains of piglets till weaning 4th week (28 days) under different treatment and control group

Age	Group			F-value	p value
	T_1	T_2	Control		
1st week (day 0–7)	138.11± 7.85	142.78± 6.73	135.01± 5.81	0.32 NS	0.72
2nd week (day 7–14)	168.01± 10.60	169.16± 12.64	161.25± 15.65	0.10 NS	0.93
3rd week (day 14–21)	179.47± 9.72	180.81± 9.67	172.74± 15.31	0.13 NS	0.89
4th week (day 21–28)	182.00± 12.65	180.71± 12.15	167.97± 14.90	0.61*	0.03
Overall	166.89± 9.97	168.46± 8.15	159.24± 8.41	0.21 NS	0.83

NS, Non-significant; *, Significant.

compared to the control group. Findings of Chitme *et al*. (2009) and Choo *et al*. (2009) revealed similar kind of result for rate of mortality. Differences in pre-weaning overall mortality and survivability recorded by earlier workers with the present findings might be due to differences in breed, weaning age, feeding and other management practices.

Among the different causes of mortality, 29.41% died due to gastroenteritis, 23.52% died in crushing by mother, 17.64% died in pneumonia, 5.88% died due to hernia, 11.76% died due to gastroenteritis + pneumonia and 11.76% died due to other causes. The present findings get support from the study of Kakati *et al.* (2019).

It can be concluded that the supplementation of Shatavari root powder @ 100 mg- 200 mg/kg body weight from day 84 of gestation till 4th week postpartum level is quite safe and viable for pig growth and mortality control. Therefore, it is beneficial and could serve as a potential management tool to improve growth performance in pure bred Large White Yorkshire sows and its piglets.

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Table 3. Mortality rate (%) of Large White Yorkshire piglets under different treatment and control groups

Age (Weeks)	Mortality % Group			p value	Chi-square value
	T_1	T_2	Control		
1st	6.06(4)	1.49(1)	6.5(4)	0.51	2.31NS
2nd	0	0	0	–	–
3rd	1.61(1)	4.76(3)	5.17(3)	0.74	1.25NS
4th	0	1.49(1)	0	–	–
Total	7.67(5)	7.74(5)	12.21(7)	0.84	8.2NS
Overall Pre-weaning mortality	8.76				

NS, Non-Significant.

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