



ISSN: 2277- 7695
TPI 2015; 4(2): 93-96
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www.thepharmajournal.com
Received: 03-02-2015
Accepted: 18-03-2015

Bikas Ch. Debnath
College of Veterinary Sciences &
A.H, R.K. Nagar, West Tripura,
Pin-799008, India

Ankan De
College of Veterinary Sciences &
A.H, R.K. Nagar, West Tripura,
Pin-799008, India

K. Ravikanth
Research & Development
Division, Ayurvet Limited, Baddi,
India

Adarsh
Research & Development
Division, Ayurvet Limited, Baddi,
India

Correspondence:
Adarsh
Clinical Research & Development,
Ayurvet Limited, Baddi, H.P.,
India

Evaluation of herbal maternal care product for timely conception, optimized fetal growth and survival rate in large white Yorkshire Sow

Bikas Ch. Debnath, Ankan De, K. Ravikanth, Adarsh

Abstract

Current study was designed to study the efficacy of herbal maternal care formulation AV/MCC/18 (*M/S Ayurvet Limited, India*) as a maternal care product in sow. Sixteen apparently healthy large white Yorkshire Sows were divided in to two groups, one served as control no treatment group (n= 8) and another as treatment group (n= 8) supplemented with AV/MCC/18 at dose rate of 10 g/ day throughout the gestation till parturition. Parameters viz. total number of services required for successful conception, litter size per sow, birth weight of day old piglet, any incidence of congenital anomalies were recorded. The results significantly revealed that AV/MCC/18 supplementation had significantly ($p>0.05$) reduced the number of services for successful conception, increased the number as well as birth weight of the piglets and significantly ($p>0.05$) reduced the mortality in new born piglets.

Keywords: Gestational stress, maternal care formulation, reproductive efficiency

1. Introduction

Good reproductive performance is a prerequisite for pig herds to be profitable. Failure of gilts and sows to conceive when they are mated is a potentially serious economic cost for swine producers. Reproductive failure or failure to achieve good reproductive performance can be grouped in to different categories related to the stage in the reproductive cycle namely anoestrus, ovulation and egg production, fertilization, implantation, fetal death, mummified pig and stillborn piglets [1]. Gestation can only be sustained by (a) hormonal balance (high progesterone concentration), (b) local cytokine and growth factor crosstalk between uterine leukocytes (especially cells of the macrophage lineage and NK cells), endometrial cells and embryonic/fetal macrophages and chorionic cells, and (c) a strong suppression of the immunity at the level of the implantation region of the uterus [2, 3]. Various stress and viral infection conditions attributes to reason for reproduction failure. Viral infections during gestation in sows are frequently causing reproductive failure, characterized by embryonic and fetal death, return to oestrus, abortion, early or late farrowing and birth of mummies, weak- and stillborn piglets [4]. Prenatal stress may be defined as stress experienced by the pregnant mother which affects the development of the offspring [5]. Gestational heat stress alters postnatal offspring body composition indices and metabolic parameters in pigs [6]. Stress is particularly harmful during the first weeks of gestation (during migration and implantation of the embryos). Heat stress during early pregnancy can alter the reproductive endocrine system, especially the control of luteal function. In addition, heat stress may have a direct effect on embryo or conceptus development [7]. Energy intake during gestation period also affects the litter size as size may actually be reduced by feeding a very low energy level in the first four weeks of pregnancy [8]. Throughout gestation retention of calcium, phosphorus, vitamin D₃, folic acid increases foetal body weight in pigs [9]. Immunological defense system in reproductive tract of sow should be sufficient. After insemination in normal cases, the neutrophils, i.e. "first line of defense", together with other factors manage to eliminate bacteria and foreign material, resulting in the uterus being "clean" when the embryos enter [10] and when embryos develop in the uterus, the immune reaction must be suppressed [11]. However there are no known non-hormonal drugs available to improve the fecundity and simultaneously reduce the stress. With these views current study was designed to study the efficacy of herbal maternal care product, AV/MCC/18 (*M/S Ayurvet Limited, India*) in successful conception after first insemination and prevention of delayed conception, in optimum feto-maternal nourishment by monitoring fetal growth & development and in controlling incidence of dystokia, abortions, congenital anomalies.

2. Materials and methods

2.1 Study Design

16 apparently healthy Large white Yorkshire Sows were selected from the flock to be served for with boar for conception. Sow were randomly divided into 2 groups, n=8 in each group, respectively. Group I was the untreated control group & no dietary treatment was given to this group. Group II was the treatment group supplemented with AV/MCC/18 at dose rate of 10 g/ day throughout the gestation till farrowing. All the sows of group I & II were served with fertile male. Both the groups were kept under similar managemental conditions & feeding schedule. Detailed gynaeco-clinical examination of the selected Sows was carried out to confirm about normal cyclicity of animals. Successful conception, exact time of conception & number of services required for conception were recorded for both the groups. Likewise, in case of non-responsiveness to treatment & failure to conception in any of sows, third service was to be done & treatment to be continued in group II. The success or failure of treatment was evaluated on the basis of parameters viz. total number of services required for successful conception, litter size per sow in both the groups, birth weight of day old piglets/sow in both the groups, any incidence of congenital anomalies, dystokia, abortions and mortality of new born piglets upto first week post farrowing.

2.2 Statistical analysis

All the results were analyzed statistically by analysis of variance to determine the means and standard error as per the methods described by Snedecor and Cochran [12].

3. Results and discussion

3.1 Services per conception

Farrowing rate has a large impact on non-productive sow days, making it an important measure of the reproductive efficiency

of the sow herd [13]. Profitability in any commercial livestock-breeding unit is related closely to reproductive efficiency. In the treatment group administered with AV/MCC/18 at dose 10 gm/day during complete gestation length the average number of services per conception were significantly (P>0.05) lower (1.25) as compared to untreated control (1.50) (Table 1). The polyherbal oral supplement was efficacious in reducing the average number of services for successful conception to certain extent. This decrease in average number of services for successful conception in of maternal care formulation AV/MCC/18 supplemented group attributes to herbs viz. *Asparagus racemosus* [14], *Withania somnifera* [15] etc as these herbs modify the immunological defense system.

Table 1: Number of Services per conception

Mean ± SE	Control group I	Treatment group II
	1.5 ± 0.19 ^a	1.25 ± 0.16 ^b

Level of significance P>0.05

3.2 Litter size per sow

Number of piglets born/sow is given in Table 2. Average litter size per sow in the AV/MCC/18 treated group II was significantly (P>0.05) higher (10.75) in comparison to control group I (8.62). Poor maternal nutrition during pregnancy can have long-term consequences on health and well-being of the offspring [16]. Maternal stress during gestation and prenatal stress in the offspring influence the fetal or neonatal development [17]. The improvement in number of piglets born per group may be attributed to herb vitamin constituents of AV/MCC/18 viz. *Cynodon dactylon* [18], alfalfa, folic acid etc. that might have reduced the gestation stress, check uterine bleeding, strengthen uterus, avert abortion and augment the foetal growth provided nourishment during gestation in sows and prevented abortion and stillbirths.

Table 2: Average litter size in each group

	Sow-i	Sow- ii	Sow- iii	Sow- iv	Sow- v	Sow- vi	Sow- vii	Sow-viii	Avg. liter size
No. of Piglets	8	10	07	09	10	08	9	08	8.62± 0.26a
Treatment Group	Sow- i	Sow- ii	Sow- iii	Sow- iv	Sow- v	Sow- vi	Sow- vii	Sow- viii	
No. of Piglets	10	11	09	12	10	11	12	11	10.75± 0.46b

Level of significance P>0.05

3.3 Average birth weight of day old piglet & kids/sow

An increase in litter size often comes with an increasing number of small, low-birth-weight and vulnerable piglets [19]. Sometime piglets so weak that gets easily crushed or do not have enough energy to get to the sow's udder for vital colostrum intake, potentially resulting in higher early mortality [20]. Birth weight was recorded for individual piglet for both the groups control and treatment. Average birth weight in the AV/MCC/18 supplemented group was significantly (P>0.05) higher i.e. 1096.48 g as compared to untreated control group, 810.61 g (Table 3).

3.4 Mortality

A big litter size is often associated with more low-birth-weight piglets and higher rates of mortality [24]. Mortality among newborn pigs at or soon after birth also represents a major loss of throughput. After birth up to fourth day 6 piglets died out of total 69 piglets in untreated control group. Therefore the percentage of mortality was 8.69% (Table 4).

3.5 Recording of any incidence of congenital anomalies, dystokia, abortions.

Any incidence regarding congenital anomalies, dystokia or abortions was not observed during the entire experiment period in Treatment group. However, one dystokia case was found in Control group. But neither abortion nor any congenital anomalies were observed in the experiment period in either groups.

Table 3: Average birth weight of piglet/ litter/sow in control group vs. treatment group

Average birth weight (g) of piglet/ litter/sow in control group									
Name of Sow	Sow- i	Sow- ii	Sow- iii	Sow- iv	Sow- vi	Sow- vi	Sow- vii	Sow- viii	Overall average birth wt. of piglet/ litter/sow
No. of piglets born	8	10	07	09	10	08	9	08	
1.	1100	1040	1100	1015	982	1005	904	956	
2.	1085	980	980	855	909	809	872	852	
3.	1035	896	805	990	882	840	851	823	
4.	1005	700	795	885	850	825	846	702	
5.	1016	835	794	803	822	703	803	683	
6.	900	810	760	664	750	672	772	630	
7.	890	660	785	690	632	623	754	600	
8.	800	625		660	600	704	702	583	
9.		755		506	650		609		
10.		690			625				
11.									
Average	978.8	799.1	859.85	785.33	770.2	772.62	790.33	728.62	810.61±5.01^a
Average birth weight (g) of piglet/ litter/sow in treatment group									
Name of Sow	Sow- i	Sow- ii	Sow- iii	Sow- iv	Sow- vi	Sow- vi	Sow- vii	Sow- viii	Overall average birth wt. of piglet/ litter/sow
No. of piglets born	10	11	9	12	10	11	12	11	
1.	1204	1169	1204	1207	1252	1211	1102	1187	
2.	1208	1207	1197	1204	1191	1174	1043	1108	
3.	1122	1024	1202	1196	1053	1185	1051	1095	
4.	1150	1003	1201	1203	1107	1132	1008	1080	
5.	1209	1109	1149	1164	1134	1165	1011	1005	
6.	1201	1150	1137	1109	1002	1008	1126	1010	
7.	1090	1175	1240	1205	1107	1122	985	950	
8.	1077	1147	1101	1008	1009	1025	1109	1021	
9.	1064	1181	1006	1050	1003	1071	1170	1145	
10.	1079	1009		998	905	1009	985	900	
11.		930		974		905	970	875	
12.				1098			1068		
Average	1140.4	1100.36	1159.1	1118	1076.3	1091.55	1052.3	1033.36	1096.48± 8.07^b

Level of significance P>0.05

Mother care product AV/MCC/18 contains folic acid ^[21], calcium, phosphorus ^[22] and vitamin D₃ ^[23] etc all supplements are necessary for foetal growth.

Table 4: Mortality (%) in control vs. treatment group up to first week post-farrowing

Group	Mortality %
Control I	8.69 ^a
Treatment II	4.65 ^b

Level of significance P>0.05

However in treatment group out of 86 piglets, 4 died. The mortality percentage was 4.65%. Therefore the mortality was significantly less (P>0.05) in treatment group as compare to control group (Table 4).

4. Conclusion

Maternal care formulation AV/MCC/18 (M/S Ayurved Limited, India) was efficacious for maternal care in sow as it reduce the average number of services for successful conception. In AV/MCC/18 supplemented group increase in piglet birth weight, litter size was observed along with significant reduction in mortality.

5. Acknowledgement

The authors are thankful to Ayurved Limited, Baddi, India and College of Veterinary Sciences & Animal science, West Tripura for providing the required facilities, guidance and support

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