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Sow Reproductive and Udder Disorders in Institutional Herds in Benue State, Nigeria: Prevalence, Risk Factors, Economic Costs and Management

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Abstract: A retrospective study involving the analysis of three institutional swine herd records in Benue state, Nigeria was carried out to determine the prevalence of reproductive and udder disorders of sows and their risk factors; evaluate the economic significance of the disorders as well as to review the methods of management of the disorders. Sows (185) and their littered 3,995 piglets in these herds were used for the study. The overall prevalence of reproductive disorders was high (19.46%) while that of udder disorders was relatively low (7.05%). The specific reproductive disorders found were abortion (2.16%), infertility (5.95%), dystocia (1.08%), metritis (2.70%), pyometra and rectovaginal fistula (each 0.54) and stillbirth (6.49%). Agalactia (2.7%), mastitis (2.16%), udder traumatic injuries (1.08%) and udder hypoplasia (0.54%) were the udder disorders found. Herd and breed factors were significantly ($p<0.05$) associated with the disorders. The estimated economic costs of the disorders were substantial. Management of the disorders in terms of personnel in charge of veterinary services, available diagnostic facilities and post treatment follow-up were inadequate but specific treatment for the disorders conformed to standard methods. It was concluded that reproductive and udder disorders are found among sows in institutional swine herds in the state with considerable economic impact and are a limiting factor to enhanced swine productivity. Herd and breed factors significantly influenced the occurrence of the disorders. The provision of veterinary diagnostic facilities and personnel were inadequate for the management of the disorders for optimal sow productivity.

Key words: Reproductive · Udder · Disorders · Sows · Nigeria

INTRODUCTION

The impacts of reproductive disorders on the productivity of any livestock enterprise need no overemphasis. Despite the new technologies for regulation of reproductive disturbance of genital functions in sows and new diagnostic methods, reproductive disorders (RDs) in sows still remain one of the most urgent problems in pig farms [1]. They are considered to be one of the main reasons for culling of sows [1]. The incidence of these disorders has been reported to range from 20.4% to as high as 61.38% [2]. Of the approximately 50% of sows being replaced annually in pig production [3-5], reproductive disorders have accounted for 27% of these removals [6]. Such removal due to reproductive disorders is mainly unplanned in early parities. For instance, approximately 15 to 20% of the sows removed have produced only 1 litter and more than 50% are removed before their fifth parity [3, 5, 7] thus causing serious economic impact. On the other hand, planned removal attributable to low production and old age, increases with greater parity numbers [3, 5]. Udder problems also constitute a serious constraint to increased livestock production given the effects on the performance of the young offspring [8] and future reproductive life of the affected females. Sow removal due to udder problems accounted for 18% of all removals in a study in Sweden [6].

Several interactive factors including management factors, animal intrinsic factors and environmental factors etc influence the occurrence of reproductive and udder disorders. Furthermore, how these disorders are managed will determine the future reproductive life and usefulness of affected animals. There is paucity of information on reproductive and udder disorders of sows in Nigeria. Sporadic reports however have been received from

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farmers on udder disorders in recent times (Personal communication, 2008). There is therefore a need to fully document the reproductive and udder disorders of sows in Benue state. This research aimed at bridging the above knowledge gaps using institutional swine herds for a start, especially because these herds serve as model herds for other swine herds in the study area.

MATERIALS AND METHODS

Study Area: The study was carried out in Gboko, Makurdi and Otukpo LGAs of Benue state. Benue state of Nigeria lies on longitude 6° 35" to 10 E and latitude 60°30"N to 8°10" of the equator. It has a population of 2,780.359 and a total land area of 30955 square kilometers [9]. The state has 23 local government areas with its headquarters at Makurdi. The State derives its name from River Benue, the second largest river in the country and it is the most prominent geographical feature in the State. At present, Benue State has twenty-three local governments, 14 in the Tiv speaking area and 9 in the Idoma speaking area. The Tiv people are the majority and spread to other states like Nassarawa, Taraba, Plateau and Cross-River, followed by the Idoma, then the Igede people and other smaller groups. Benue State lies in the middle of the country and thus falls within the middle Belt States and shares boundaries with Nassarawa to the North; Taraba to the East; Cross River to the South; Enugu to the South-West and Kogi to the East. The State also shares a common boundary with the Republic of Cameroon on the southeast and has a population of about 2,780,389 and occupies a landmass of 30,955 square kilometers [9].

Benue State has been rightly christened the "Food Basket of the Nation" because of its rich agricultural potentials [9], which include yams, rice, beans, cassava, sweet potatoes, maize, Soya beans, sorghum and cocoyams. It has vast and fertile landmass, which is tilled by the over 70% of its population that treasures agriculture as the bedrock of its livelihood. The River Benue equally presents great potentials for a viable fishing industry and dry season farming through irrigation.

Benue State experiences a typical tropical climate with two distinct seasons, the wet or rainy season and the dry season. The rainy season lasts from April to October with annual rainfall in the range of 150-180 mm. The dry season begins in November and ends in March. Most of the people in the State are farmers while inhabitants of the riverine areas engage in fishing as their primary or important secondary occupations. Benue State is acclaimed the nation's food basket because of its diverse rich agricultural produce which includes yams, rice, beans, cassava, soya beans, benniseed, maize, sorghum, millet, tomatoes and a lot of fruits. Poultry, goat, sheep, pigs and cattle are the major domestic animals kept.

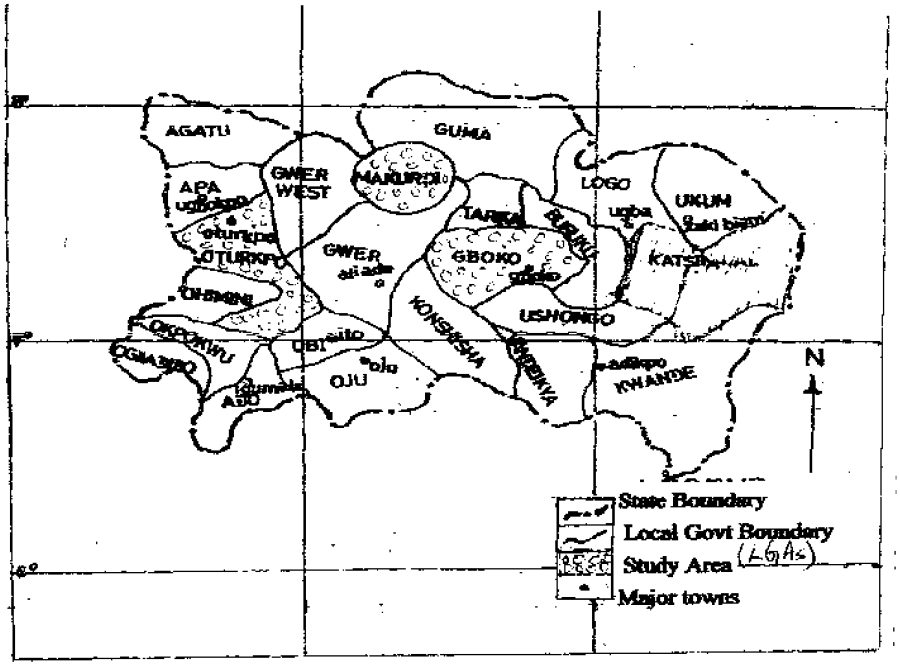

Fig. 1: Map of Benue state showing local government areas (dots-where study herds are located).

Location of Herds: The study was carried out on three herds designated as A, B and C, which were located in Gboko, Makurdi and Otukpo, respectively in Benue state. All the herds were institutional herds. These herds were chosen for this pilot study because of their ease of accessibility and anticipated cooperation.

Herd Description and Management

Herd A: This herd was established in 1963. The herd has a landmass of 100 M^2. It is located at Gboko, the headquarters of Gboko LGA. The farm also has 35 cattle, 60 goats, 34 sheep, 200 poultry and 120 rabbits. The current herd size was nil as all the pigs were sold out due to a threatened African swine fever outbreak. However, from available records, the breed in the herd was Large White x Hampshire cross. There were 5 staffs who are in charge of the farm, consisting of full tie and part time staff. The housing was made up of a standard building with roof and individual room for sows and cement floor. The breeding system was natural, with a male to female ratio of 1:10. Gilts were bred on-farm. The pigs were fed twice a day, with starter, grower, finisher, forages/roughages and home-made rations. The gilts and boars are fed 3kg feed per day and lactating sows are fed 3 kg while piglets are fed *ad libitum*. Concentrates were given to all categories in unspecified amounts occasionally. The source of water was a borehole and water was provided *ad libitum*. The sows in gestation were wet cleaned with cleaning additives. Chemical disinfection was employed on the farm. All the production areas (gestation, lactation, weaners and fatteners) were disinfected once daily in the morning. Disinfection was affected by the cost of chemicals as well as absence of water when the borehole broke down. No vaccinations were provided the pigs. Treatment against endoparasites was given routinely to all pigs, sows thrice, weaned pigs twice a year, gilts once and boars twice a year respectively. Pregnancy diagnosis was done using the boar. There was no batch farrowing. The farmer sometimes supervised farrowing. Piglets were not weighed after birth. Colostrum ingestion by the piglets is ensured to have taken place. Iron injection (iron dextran) was given to the piglets during the first three days of life. No hormonal treatment was given to the pigs.

Herd B: This herd was established in 1985 and has a current herd size of 32 pigs. It is located in the North Core area of the University of Agriculture, Makurdi, in Makurdi town. The farm also has 45 cattle, 12 goats, 32 sheep, 670 poultry and 37 rabbits. The current herd size was 53 pig consisting of 10 sows, 2 boars, 22 gilts and 19 piglets. The breeds present were large white, Land Race, Hampshire and Large White x Land Race x Hampshire crosses respectively. There were 4 staffs in charge of the farm on full time basis. The housing was made up of a standard building with roof and individual room for sows and cement floor. The breeding system was natural, with a male to female ratio of 1:10. Gilts were bred on-farm and some were bought from other piggeries. The husbandry system was intensive. The pigs were fed twice a day, with starter, grower, finisher, forages/roughages and home-made rations. The gilts and boars were fed 3 kg feed per day and lactating sows are fed 3kg while piglets are fed *ad libitum*. Pigs were fed individually twice daily at 2 kg of feed per head per day. Concentrates (soyabeans, maize and dried brewer's grain) were given to all categories of pigs in unspecified amounts occasionally. Feed supplementation is given (*Tridax,Prucubences, Amaratius*) to sows, pregnant sows and lactating sows. The source of water was from the well and tap and water was provided *ad libitum*. The sows in gestation and lactation are dry cleaned with cleaning additives. Chemical disinfection was employed on the farm. All the production areas (gestation, lactation, weaners and fatteners) were disinfected once daily in the morning. Disinfection was however depended on the availability of chemicals. No vaccinations were provided to the pigs. Treatment against endoparasites was given routinely to all pigs, sows once or twice/year, weaned pigs once a year and gilts twice/yr. Routine pregnancy diagnosis is not. There is no batch farrowing. Farrowing was not routinely supervised but sometimes it took place in the presence of the farmer/herdsman. Sows are washed before being introduced into the farrowing pen. Piglets are weighed after birth. Colostrum ingestion by the piglets was ensured to have taken place. Oral injection of iron was given to the piglet. There was no hormonal treatment given to the pigs.

Herd C: This herd was established in 1974 and has a current herd size of 32 pigs. It is located at Otukpo the hqs of the LGA. The current herd size was 53 pig consisting of 10 sows, 2 boars, 22 gilts and 19 piglets. The breeds present were Large White, Land Race, Hampshire and Large White x Land Race x Hampshire crosses respectively. There were 15 staffs in charge of the farm on full time basis. The housing was made up of a standard building with roof and individual room for sows and cement floor. The breeding system was natural, with a male to female ratio of 1:5. Gilts were bred on-farm and some were bought from other piggeries. Weaning was done at 52 days. The husbandry system was intensive. The pigs were fed twice a day, the feed consisting of

maize, groundnut cake/soyabean cake, maize/wheat offal and rice offal. The gilts and boars were fed 2 kg feed per day and lactating sows were fed 2.5 kg while piglets were fed *ad libitum*. Pigs were fed individually and in groups. No supplementation was given. The source of water was from the well and tap and water was provided *ad libitum*. The sows in gestation and lactation are dry cleaned with cleaning additives. Chemical disinfection was employed on the farm twice a month. All the production areas (gestation, lactation, weaners and fatteners) were disinfected once daily in the morning. No vaccinations were provided the pigs. Treatment against endoparasites was given routinely to all pigs, sows once or twice/year, weaned pigs once a year and gilts twice a year. Routine pregnancy diagnosis was not done and there was no batch farrowing. There was no farrowing supervision policy *per se* but farrowing was sometimes in the presence of the farmer/herdsman especially during the daytime. The farrowing pens were washed before sows were introduced into them. Piglets were weighed aftser birth. Colostrum ingestion by the piglets was ensured to have taken place. Iron injection was given to the piglets. There was no hormonal treatment given to the pigs.

Animals: All the adult female pigs that farrowed (sows) at least once and their piglets in the study herds whose records were available were used for the study. Ear tags properly identified them.

Study Design: The study was made up of two phases-retrospective and prospective phases.

Retrospective Study: The structured questionnaire (Appendix I) covering information on herd such as age of herd, manpower in charge, land area, herd size and structure, management practices, production indices, past medical conditions of the herd, nature of veterinary services and care, disease prevention, acquisition of new animals, was distributed to the managers of the respective swine herds who completed them. In addition, personal interviews and interactions with the managers and herdsmen were held on certain aspects that were not adequately covered by them in the course of completing the questionnaires.

Parameters Studied and Methods Used

Prevalence of Reproductive and Udder Disorders: Using the information generated from the two study phases, the total number of sows from all the herds, individual herds and breeds, constituting the respective populations at risk for reproductive and udder disorders were established. Similarly, the total number of reproductive and udder disorder cases, based on overall, herd and breed variables was established. The respective prevalence values were thereafter calculated.

Risk Factors of Reproductive and Udder Disorders: The effects of herd and breed variables were examined as risk factors for reproductive and udder disorders by comparing the prevalence of the disorders between herds and among breeds using statistical methods.

Management Methods for the RD and UD and Challenges Facing Their Management: An assessment of how the diagnosis of RD and UD was made in term of personnel, diagnostic facilities employed, how the disorders were treated, postreatment follow up and the challenges facing the management of the disorders in the herds was made using farm records and personal interviews.

Economic Impact of RD and UD: The economic significance or impact of RD and UD was assessed using the farm gate price approach on direct losses (dam mortality, piglet losses, etc). Also, indirect effect of the disorders was assessed by comparing some performance indices such as litter weight (at birth and during weaning) and farrowing interval of sows with and without the disorders.

Data and Statistical Analyses: The prevalence of the disorders was calculated by dividing the total number of cases of the disorders by the respective populations at risk and multiplied by 100 to express as a percentage. The results were expressed in the form of appropriate descriptive statistics and prevalence rates among herds and breeds were subjected to Chi square test for statistical significance difference at p value of 5%. All data were analyzed using Graph Pad Prism 4. Farm gate price method was used to estimate economic impact of RD and UD; and T-Test was used to test for significant difference among some performance indices of sows with and without RD and UD to assess indirect economic effect of the disorders.

RESULTS

Overall and Herd Prevalence of Reproductive Disorders: The types of reproductive disorders of sows and their respective prevalence values are presented in table 1. The overall prevalence of reproductive disorders was high. On overall basis, stillbirth (6.49%) and infertility (5.95%) were the most prevalent disorders.

Table 1: Overall and herd prevalence of reproductive disorders of sows in swine herds

	Number of cases/Prevalence (%)							
	Herd A (n-10)		Herd B (n-37)		Herd C (n-128)		Overall (n-185)	
Reproductive Disorder	Cases	%	Cases	%	Cases	%	Cases	(%)
Abortion	0	0	4	10.81	0	0	4	2.16
Infertility	0	0	6	16.22	5	3.91	11	5.95
Dystocia	2	20	0	0	0	0	2	1.08
Metritis	0	0	5	13.51	0	0	5	2.7
Stillbirth	0	0	9	24.32	3	2.34	12	6.49
Pyometra	0	0	1	2.7	0	0	1	0.54
Rectovaginal fistula	1	10	0	0	0	0	1	0.54
Total	3	30	25	67.57	8	6.25	36	19.46

Table 2: Overall and herd prevalence of udder disorders of sows in institutional herds

	Number of cases/Prevalence (%)							
	Herd A (n-10)		Herd B (n-37)		Herd C (n-128)		Overall (n-185)	
Reproductive Disorder	Cases	%	Cases	%	Cases	%	Cases	(%)
Agalactia	2	20	3	8.11	0	0	5	2.7
Mastitis	0	0	3	8.11	1	0.78	4	2.16
Traumatic injuries	3	30	0	0	0	0	2	1.08
Udder underdevelopment	0	0	0	0	2	1.56	1	0.54
Udder ectpoarasitism	1	10	0	0	0	0	1	0.54
Total	6	60	6	16.22	3	2.34	13	7.03

Table 3: Breed prevalence of reproductive and udder disorders in institutional swine herds

	Disorder/Prevalence (%)				
	Reproductive			Udder	
Breed	Total number	No. of cases	Prevalence	No. of cases	Prevalence
Large White	71	19	26.76	4	5.63
Hampshire	46	3	6.52	2	4.35
Large White Cross	38	9	23.68	6	15.79
Large Black	3	2	66.67	1	33.33
Landrace	5	3	60	1	20
Duroc	6	0	0	0	0
Duroc Cross	6	0	0	0	0

There was high prevalence of reproductive disorders in herds A and B, with herd B having the highest prevalence (67.57%). Herd B had most of the observed disorders except dystocia (20%) and rectovaginal prolapse (10%) that occurred only in herd A.

Overall and Herd Prevalence of Udder Disorders: The prevalence of udder disorders at the herd level and overall is shown in table 2. The overall prevalence of the disorders was relatively low (7.57%). The udder disorders were mastitis, agalactia, traumatic injuries and udder ectoparasitism and each of them had overall low prevalence rate. There was a very high prevalence of udder disorders in herd A (60.00%) and very low prevalence in herd C (2.34%). Herd A had the highest prevalence of all the disorders except mastitis, which was only recorded in herd B. Specific disorders had high prevalence at the herd level particularly in herd A.

Breed Prevalence of Reproductive and Udder Disorders: The breed prevalence of reproductive and udder disorders is shown in table 3. Among the most preponderant breeds (large White, Hampshire and their crosses), the Hampshire breed had the least prevalence of reproductive disorders (6.52%). The Duroc and Duroc cross breeds both recorded no cases of the disorders.

Table 4: Management approach and challenges of reproductive and udder disorders in institutional swine herds

	Management approach			
Herd	Diagnosis by	Diagnostic tools employed	Assessment of outcome of treatment	Management challenges
A	Veterinarian	History and clinical examination	Not available	Lack of drugs
B	Veterinarian	History and clinical examination	Not available	Lack of lab facility and drugs
C	Animal Health Assistant	History and clinical examination	Not available	Lack of lab facility and drugs

Table 5: Management methods for specific reproductive and udder disorders of sows in swine herds

Disorder	Management methods
Abortion	Antibiotic
Infertility	Culling
Stillbirth	-
Dystocia	Caesarean section
Metritis	Antibiotics
Pyometra	Antibiotics
Rectovaginal fistula	Surgical correction followed by salvage
Mastitis	Antibiotics
Agalactia	Oxytocin injection
Traumatic udder injury	Antibiotics
Udder ectoparasitism	Acaracide spray, used engine oil

Table 6a: Estimated economic losses associated with reproductive and udder disorders of sows

Source of loss	Total cost/loss (N)
Reproductive disorders	
Abortion	600
Dystocia	10,000.00
Metritis	7,500.00
Pyometra	150
Rectovaginal fistula	5,000.00
Udder disorders	
Agalactia	40,000.00
Mastitis	2,000.00
Traumatic injuries	500
Udder underdevelopment	8,000.00
Udder ectoparasitism	500
Culling of sows	61,000.00
Stillbirth	192,000.00
Piglet loss due to abortion	112,000.00
Preweaning piglet mortality	8,632,000.00
Veterinary services	6.500.00
Total	9,066,250.00*

* Figure is exclusive of cost of extra manpower hours spent

Table 6b: Effect of reproductive and udder disorders on average litter weight and farrowing interval of sows

	Category of sows	
Parameter	With disorders (n-25)	Without disorders (n-29)
Average litter weight (kg)		
At Birth	1.09[a]	1.14[b]
At weaning	6.1[a]	7.3[b]
Farrowing interval (days)	177.55[a]	165.17[b]

a, b different superscripts in rows indicate significant difference (p<0-05)

There were proportionately low numbers and very high prevalence of RD in the Large Black (66.67%) and Landrace breeds (60.00%) respectively. The Large White crossbreds had the highest prevalence (15.79%) of udder disorders among the preponderant breeds. The Duroc and Duroc breeds had 0% prevalence of udder disorders. High prevalence of udder disorders was recorded for Large Black and Landrace breeds respectively but these breeds were numerically very low in numbers.

Management Approach to and Challenges of Reproductive and Udder Disorders: Table 4 shows the management approaches employed by veterinarians and/or animal health assistant in managing the disorders as well as the challenges faced by them. Whereas the veterinarian was used to make diagnosis of clinical disorders in herds A and B, only history and clinical examination were used in arriving at diagnosis but no laboratory facilities were employed for the confirmatory diagnosis of the disorders. Information on the assessment of treatment outcome was not available in all the herds. The lack of and/or cost of drugs and laboratory facilities were the major challenges facing the management of these disorders.

Management Methods for Specific Reproductive and Disorders: The specific treatment methods for reproductive disorders are shown in table 5. Chemotherapy using antibiotics was employed for the treatment of most of the infection related reproductive disorders and traumatic udder disorder while surgery (Caesarean section) was used to correct dystocia and rectovaginal fistula respectively. Hormonal treatment was used for managing agalactia. Sows suffering from infertility condition were culled.

Economic Losses Incurred from Reproductive Disorders and Effect of the Disorders on Litter Weight and Farrowing Interval: The estimated economic losses from reproductive and udder disorders are presented in tables 6a and 6b. Most of the losses were associated with piglet losses resulting from abortion, stillbirth and agalactia. Apart from the losses associated with culling, additional losses resulting from the loss of piglets that would have been born contribute to the total losses.

DISCUSSION

This study has documented comprehensively for the first time the reproductive and udder disorders of sows in Benue state. The disorders included abortion (2.16%), infertility (5.95%), dystocia (1.08%), metritis (2.70%), pyometra (0.54%) and rectovaginal fistulas (0.54%); with infertility as the most prevalent RD. Limited information exists on the reproductive disorders of sows in Nigeria [10]. The study therefore provided base line information for pig farmers for the control of the disorders in their farms. Reproductive disorders of domestic animals cause significant economic losses in the animal industry [11].

Rds have a bearing on reproductive performance [12]; and affect the reproductive life of affected animals through the cost of management and intense culling [13, 14]. Even with the best of management practices, reproductive disorders such as infertility have been reported to reduce performance due to reduced conception rate and delay to postpartum ovulation [15] and are considered to be the most common reason for culling of sows [16] and reduction of sow longevity and productive life [2, 16]. Approximately 50% of sow's removal annually in pig productions is due to infertility [3-5].

The overall prevalence of 19.46% of RD obtained in this study falls within the range of 20.4% to 61.38% for pigs in Lithuanian pigs farms [2]. The incidence of RD is considered to be on the increase in many countries [12]. In association with a plethora of other limiting factors to sow productivity, this figure may be considered to be of significant impact on sow productivity in these herds. The particularly high prevalence of RD in herd B (67.57%) has serious implications for the productivity of sows in this herd. Efficient record keeping in this herd compared to the other herds is thought to account for this disparity between herd B and the rest since the management system in this herd was not substantially different from the rest. The 6.49 % prevalence of stillbirth obtained in this study is slightly higher than the acceptable 5% target figure for efficient productivity [17]. A 6% prevalence of stillbirth caused 6 % loss in litter size [16]. Dystocia, one of the reproductive disorders that most compromise the future reproductive life of sows [18], appeared to be high in herd A (20.0%) that had a limited sow population. This could not be easily explained. The abortion rate obtained in this study for herd B (2.16%) is well above what is considered acceptable for efficient pig productivity [17].

This study was also the first documented work on udder disorders in sows in this area. The udder disorders of agalactia (2.7%), mastitis (2.16%), traumatic injuries (1.08%), udder underdevelopment (0.54%) and udder ectoparasitism (0.54%) recorded in this study were those commonly reported for sows in the literature [2, 19, 20, 21]. The overall prevalence of the udder disorders of 7.03% is low. However, udder problems constitute a serious

constraint to increased livestock production given the effects on the performance of the young offspring [8] and future reproductive life of the affected females. Mastitis has been reported to be an economically important mammary disorder in sows that greatly affects pig productivity through insufficient nutrition for piglets either by insufficient milk production and or refusal to allow suckling by the dams [8]. They negatively affect the health and growth of newborns and pose public health hazards to populations consuming milk 19, 20]. The disorders also cause a transient or persistent infertility affecting general health of sows [2]. Udder problems accounted for 18% of all sow removals in a study in Sweden [6]. The 20% prevalence of agalactia in herd A in this study is higher than figures reported by other workers (5.5%-10.3% for Swedish pig [22]; 9.5% and 14.36% in Denmark [23, 24]. Agalactia is responsible for the death of piglets due to lack of colostral injection at the right time in life as well as the absence of enough nutrition to sustain piglet life. Traumatic injuries had a prevalence of 30% in herd A in this study which is higher than the range of 5.7%-16.3% reported in sows at weaning in Sweden [25]. Traumatic injuries of the udder are associated with mastitis and the refusal of the dam to allow piglet suckling [8]. In this study, there was no apparent association between high injuries and clinical mastitis in herd A where the injuries were high. However, this study did not investigate subclinical mastitis which may have provided a clearer picture in this respect. The high prevalence of udder disorders in herd A cannot be readily explained as this is complicated by the limited sow size in this herd. Effective tick control in herds B and C probably accounted for the absence of udder ectoparasitism in these herds.

Herd was found to be a risk factor in the occurrence of RD and UD with herd A having the greatest risk for all the disorders except mastitis. This is in agreement with the findings of other workers that management practices in a herd affect the occurrence of these disorders. Similarly, breed appeared to be a risk factor in the occurrence of RD and UD in sows. The LW had the highest prevalence (26.75%) of RD while its Crosses had the highest prevalence of (15.75%) of UD. However, due to the relatively low numbers of the other breeds, this result must be interpreted with some caution. Several factors including parity, management, environmental temperature, level of feeding and genetics influence the occurrence of reproductive and udder disorders. Crossbreeding has also been associated with increased occurrence of reproductive disorders and this may explain the high prevalence of the disorders in the LWX breed in this study. The high prevalence of these disorders in this breed in all the herds provides credence to this observation. On the basis of these results, it may be safe to recommend that swine enterprises with the Large White and its Crossbreds should adopt preventive measures against these disorders in their farms.

The ways in which RD and UD are handled have been reported to affect the future reproductive life of sows. The desirability of a detailed diagnostic work up and management of RD and UD cases using qualified veterinary personnel and laboratory facilities, correct diagnosis and treatment as well as post treatment follow up or assessment needs no overemphasis. There is no doubt that clinical examination provides valuable information for diagnosis of reproductive problems in pigs [26] but the confirmation of diagnosis depends on laboratory back up. The absence of adequate laboratory facilities and services, culminating in the blanket use of antibiotics in conditions suspected to be of infectious origin are obvious deficiencies.. Indiscriminate use of antibiotics may predispose to the problem of drug resistance in our environment. The general treatment methods adopted for managing the disorders generally conformed to the standard procedures reported in the literature. The apparent absence of post treatment follow-up as observed in this study does not provide adequate information in this regard. This reflects the quality of records in these herds. The need for personnel in charge of pig herds to ensure an improvement in the quality of their records particularly reproductive and productivity records therefore is obvious. It is also not very clear whether the choice of Caeserean section (CS) in handling the dystocia cases was really justified given the availability of less stressful and costly methods including traction. The economics of treatment is critical in food animal practice. In many countries alternative treatment for these disorders such as acupuncture and homeopathic therapy is assuming relevance [11]. These methods are considered relatively cheaper and environmentally friendly than the convention methods. Alternative therapy is particularly desirable and viable option in our environment given the poor economic status of most rural farmers.

Lack of laboratory facilities and high costs of chemotherapeutic agents were identified as the major challenges and constraints to the management of reproductive and udder disorders in these herds. In addition, there were no qualified veterinary personnel involved in the day to day management of the sows and as such some of these disorders may be missed at the appropriate time. In such situations, the eventual handling

of the disorders if identified at all may be more complicated. The situation may well have affected the overall prevalence of the disorders as obtained in this study.

The estimated economic costs of reproductive and udder disorders in these herds are considered to be substantial. These resulted principally from the high prevalence of piglet mortality, stillbirth and costs of treatment of the disorders. But indirect losses through lowered performance indices were also obvious. Reproductive disorders are associated with poor reproductive performance which in turn leads to economic losses due to reduced production and additional cost of management [27]. Sub-fertility, infertility and sterility, the outcomes of impaired normal reproductive function, all result in economic losses due to anestrus, extended dry period, late maturity, decreased farrowing percentage and life time productivity of the animal, cost of management and intense culling of the affected animals [13, 14]. High economic costs of reproductive disorders have been reported in Sweden, Denmark and USA. A high impact of reproductive disorders has also been reported in cows in Zaria [28]. It is cheaper to prevent diseases than to treat, therefore, measures that will ensure biosecurity and reduce the occurrence of these disorders should be of prime importance to pig farmers. The impact of losses on the socioeconomic well being of farmers can easily be imagined. In addition, lowered pig productivity resulting from these disorders will impact negatively on the supply chain that would have met the demands for pigs and products socially and culturally in Benue state. Furthermore, the economic potential for the state in terms of revenue generation and poverty reduction are likely to be compromised under the circumstance.

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REFERENCES

1. Karveliene, B. and V. Riskevicienem, 2009. Postmortem evaluation of genital organs from sows with reproductive disturbances. Vet arhiv, 79(3): 269-279.
2. Laureckiene, Z., J. Klimaite, A. Aniuliene, V. Bizokas and E. Eugenijus-Aniulis, 2006. Prevention of sow uterine inflammation. Bull. Vet. Inst Pulawy, 50: 509-512.
3. Boyle, L., F.C. Leonard, B. Lyach and P. Brophy and P. 1998. Sow culling patterns and sow welfare. Irish Vet. J., 61: 354-357.
4. Rodriguez-Zas, S.L., B.R. Southey, R.V. Knox, J.F. Connor, J.F. Lowe and B.J. Roskamp, 2003. Bioeconomic evaluation of sow longevity and profitability. J. Anim. Sci., 8: 2916-2922.
5. Engblom, L., E. Lundhein, A.M. Dalin and K. Andersson, 2007. Sow removal in Swedish commercial herds. Liv. Prod. Sci., 106: 76-86.
6. Engblom, L., E. Lundehein, M. Strandberg, del P. Schneider, A.M. Dalin and K. Andersson, 2008. Factors affecting length of productive life in Swedish commercial sows. J. Anim. Sci., 86: 432-441.
7. Lucia, T., G.D. Dial and W.E. Marsh, 2000. Life time reproductive performance in female pigs having distinct reasons for removal. Liv. Prod. Sci., 63: 213-222.
8. Ross, R.F., B.J. Zimmermann, W.C. Wagner and D.F. Cox, 1975. A field study of coliform mastitis in sows. J. Amer. Vet. Med. Assoc., 167: 231-235.
9. Benue State Government, 2004. Benue State Economic Empowerment Development Strategy (BENSEEDS). Second Draft Report, pp: 1-136.
10. Agbagha, F.M., F.U. Ezema and B.C.O. Omeka, 1999. Studies of management effects on fertility of purebred and crossbred exotic gilts in two breeding farms at Nsukka, Nigeria. Nig. J. Anim. Prodn., 28(1): 20-25.
11. Instituto Bioethicus, 2009. Acupuncture treatments for animal reproductive disorders. Available from: http://users.med.auth.gr/%7Ekaranik/english/vet/rogers.htm (Accessed 2009).
12. Khan, H.M., M. Bhakat, T.K. Mohanty, A.K. Gupta, V.S. Raina and M.S. Mir, 2009. Peripartum reproductive disorders in Buffaloes-an overview. *Vetscan.mht* pp: 1-8. Accessed 11/2/2009.
13. Agarwal, S.K. and O.S. Tomer, 2003. Reproductive technologies in buffaloes. 2nd edition. A monograph published by communication centre, Indian Veterinary Research Institute, Izatnagar, India.
14. Agarwal, S.K., S.K. Singh and R. Rajkumar, 2005. Reproductive disorders and their management in cattle and buffaloes: A review. Indian J. Anim. Sc., 75(7): 58-73.
15. LeBlanc, S.J., T.F. Duffield, K.E. Leslie, K.G. Bateman, G.P. Keefe, J.S. Walton and W.H. Johnson, 2002. Defining and diagnosing postpartum clinical endometritis and its impact on reproductive performance in dairy cows. J. Dairy Sci., 85: 2223-2236.

16. Oravainen, J., 2008. Field studies on infectious reproductive diseases and lameness in sows. Thesis, Department of Production Animal Medicine, Faculty of Veterinary Medicine, University of Helsinki, Finland.
17. Stein, T.E., 1990. Interpreting production data from swine breeding herds. Agric. Practice, 11: 30-34.
18. Correa, M.T., H. Erb and J. Scarlettz, 1993. Path analysis for seven postpartum disorders in dairy cattle. Anim. Rep. Sci., 96: 240-249.
19. Tibary, A. and Anouassi, 2000. In: Recent Advances in camelid Reproduction.
20. Skidmore, J.A. and G.P. Adams, (Eds). IVIS (www.ivis.org). Document No. A1006.1100.
21. Holtenius, K., P.K. Waller, B. Essen-Gustavsson, P. Holtenius and C.H. Sandfren, 2004. Metabolic parameters and blood leukocyte profiles in cows from herds with high or low mastitis incidence. The Vet. J., 168: 65-73.
22. Karimuribo, E.D., L.J. Kusiluka, R.H. Mdegela, A.M. Kapaga, C. Sindato and D.M. Kamabarage, 2005. Studies on mastitis, milk quality and health risks associated with consumption of milk from pastoral herds in Dodoma and Morogoro regions, Tanzania. J. Vet Sci., 6(3): 213-221.
23. Backstrom, L., 1973. Environment and health in piglet production. A field study of incidences and correlations. Acta Vet Scand. Suppl., 41: 1-240.
24. Jorsal, S.E., 1983. Morbiditat hos soer Epidemiologiske underogelser I intensive sobesaetninger, med saerligt henblik pafarefebersyndromet. Licentiatafhandling, Institut for intern medicin, Den kgl. Veterinaer-org Landbohojskkole, Kobenhavn, pp: 1-118.
25. Persson, A., A.E. Pedersen, L. Goransson and W. Kuhl, 1989. A long term study of the health status and performance of sows on different feed allowances during late pregnancy. I. Clinical observations with special reference to agalactia post partum. Acta Vet. Scand., 30: 9-17.
26. Persson, A., 1996. Mastitis in Sows. Clinical, bacteriological and cytological examinations in assessing udder health during early lactation at weaning. Doctoral Thesis. Swedish University of Agricultural Sciences, Uppsala.
27. Meredith, M.J., 1981. Clinical techniques for the examination of infertile sows. Proceedings of the Pig Vet. Society, 8: 49-53.
28. Mulligan, F.J., L.O' Glady, D.A. Rice and M.L. Doherty, 2006. A herd health approach to dairy cow nutrition and production disease of the transition cow. Anim. Rep. Sci., 96: 331-353.
29. Ate, I.U., P.I. Rekwot, A.J. Nok and L.B. Tekdek, 2007. Economic losses associated with puerperal disorders of cows in settled cattle herds in Zaria. JAVA, 6(7): 863-866.