



# Major Reproductive Health Problems of Dairy Cows at Horro Guduru Animal Breeding and Research Center, Horro Guduru Wollega Zone, Ethiopia

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**Abstract:** Questionnaire survey together with longitudinal study (regular follow-up) were conducted from November, 2011 up to April, 2012 on major reproductive health problems of Horro and Horro-Jersey cross bred cows in and around Wollega University Horro Guduru Animal Breeding and Research Center. The aim of this study was to determine the prevalence of major reproductive health problems in Horro Guduru Animal Breeding and Research Center. From 402 (303 local and 99 cross breeds) assessed, employing questionnaire survey (n=261) and regular follow-up (n=141); 39.5% (n=159) had at least one of the major reproductive health problems. The reproductive health problems according to their relative importance at the study site were; retained fetal membrane, dystocia, metritis, abortion, milkfever, pyometre, repeat breeder, uterine and vaginal prolapse with their respective prevalence rate of 10.0%, 9.2%, 7.0%, 4.42%, 3.73%, 2%, 1.24%, 1.7% and 0.5%. This particular study indicated that clinical reproductive problems, which include retained fetal membrane, dystocia, metritis and abortion, were found to be the three most prevalent reproductive problems in the center. And from the risk factors, it is found out that as age increases almost the prevalence of all the three most important reproduction problems shown to decrease. Specifically there was a significant association between age of 3 - 5 years cow ( $p < 0.05$ , OR=5, CI (0.15, 0.88) and metritis. Similarly the effect of parity (lactation stage) on the prevalence rate of reproductive problems was assessed and there was non-significant ( $P > 0.05$ ) association between prevalence rate of reproductive problems and the parity of the individual dairy cow. The reproductive problems were also assessed in relation to body condition score of the cows and the associations were found to be statistically not significant ( $P > 0.05$ ). However, factors like hygiene practice at and around calving (HAC), was found to have an association with the occurrence of retained fetal membrane ( $P < 0.05$ ) and statistical association indicates the presence of less exposure for retained fetal membrane for animals kept at good hygienic status (OR=8, CI (0.2, 0.76). This particular study showed that; clinical reproductive health problems, which include retained fetal membrane, dystocia and metritis, were one of the major reproductive problems responsible for the low reproductive performance of Wollega University Horro Guduru Animal Breeding and Research Center and its surrounding dairy cows, Horro Guduru Wollega, West of Ethiopia.

**Keywords:** *Dystocia, Horro Guduru, Metritis, Retained Fetal Membrane*

## 1. Introduction

The goal of reproduction management is to have cows become pregnant at a biologically optimal time and at an economically profitable interval after calving. And the general goal for postpartum reproductive health in dairy cattle is for the uterus to be completely involutes and free of infection, and for cows to be cyclic by the time they enter the

breeding period (after 50 to 60 days post partum) [1]. With this, the reproductive goal that we need to follow are 12 months of calving intervals, 85 days open, 1.6 serves per conception rate and 85% of cows observed in estrous and recorded by 60 days fresh [2].

Albeit of this, various research works showed that, reproductive efficiency of dairy cows is influenced by different factors including genetic, season, age, production

system, nutrition, management, environment and disease [3, 4]. Besides, [5] also reported reproductive health problems as one of the different production constraints, which mainly, form a bottleneck in the production process and productivity of the livestock sub-sector (small holder dairy production system) of Ethiopia.

Generally, it is accepted that bovine genital diseases, either specific or non-specific in nature, account for large number of pregnancy failure in cows [6]. Among the major reproductive health problems that have direct impact on reproductive performance of dairy cows are abortion, dystocia, retained fetal membrane (RFM), metritis, prolapse (uterine and vaginal), anoestrus and repeat breeding. These could be classified as prepartum and postpartum reproductive problems [7, 8].

Currently the majority of published articles are focusing on reproduction abnormalities that mainly impair uterine immunity [9, 10]. Uterine function is often compromised in cattle by bacterial contamination of the uterine lumen after parturition; pathogenic bacteria frequently persist, causing uterine disease, a key cause of infertility [11]. The presence of pathogenic bacteria in the uterus causes inflammation, histological lesions of the endometrium, delays uterine involution and perturbs embryo survival. [12] described the effects of bacterial uterine infections on ovarian functions and subsequent reproductive wastages in dairy cows.

In Ethiopia dairy cattle are maintained under different production systems. The difference in management (production) systems and environmental conditions under which cattle are maintained could greatly affect the occurrence of reproductive health problems which result in poor reproductive performance [13]. Although, many works done so far depicts major reproductive disorders are greatly responsible for high economic loss and their reproductive performance in dairy cows, the research done on the prevalence, etiology and relative importance of these reproductive health problems in and around Wollega University Horro Guduru Animal breeding and Research Center was less. So this particular study was designed to investigate the magnitude of major reproductive disorders in Horro and Horro cross Jersey breed kept in and around Wollega University Horro Guduru Animal Breeding and Research Center. Therefore, the objectives of the study were; to determine the prevalence of major reproductive health problems in Horro and Horro cross Jersey bred dairy cows, to describe the occurrence of reproductive health problems in the dairy cows and assess their contribution for poor reproductive performance and to find out the associated risk factors affecting production and reproductive performance of dairy cows in the center.

## 2. Materials and Methods

### 2.1. Study Area

The study was carried out from November, 2011 to April, 2012 in Wester Ethiopia, Horro Guduru Wollega,

Gudurudistrict, in Wollega University Horro Guduru Animal Breeding and Research Center (WUHABRC) and Kombolcha Town. The center is located 282 km away from Addis Ababa and 262 km from Nekemte. The total land coverage of the district is 7971.32 hectares from which 764.09 hectares occupied by the center. The land of the district is covered by different farmstead structures and cultivated forage plants and seed crops. The research center is located at an altitude of 1500-2400 above sea level (a.s.l), 09°29' North latitude and 37°26' East longitudes. The mean annual rain fall in the area is 1500 mm in average. The mean seasonal temperature varies from 25-32°C from October to June and decline to a level of 18-32°C during the rest of the months [14]. The topography of the area is semi-highland (75%) and highland (21%). The vegetation of the habitat ranges from broad leaves savannah to woodland and open wooded grassland to forest types [15].

### 2.2. Study Population

In this study only dairy cows that were kept in the center were considered. The study involved different management systems (extensive and semi-intensive), as stated by [16].

### 2.3. Study Design and Methodology

Longitudinal or follow-up study and questionnaire survey were under taken on Horro breed dairy cattle and their crosses in the research center and Kombolcha Town from November, 2011 to April, 2012 to assess the reproductive health problems and few reproductive performance parameters of dairy cows. Methods of data collection were based on structured questionnaire survey and regular follow-up format on the selected dairy cows and recorded data from the center.

*Questionnaire survey:* A standard questionnaire format was prepared for this purpose and about 59 heads of the house hold were interviewed and a total of 261 dairy cows were included in this survey. During the study period, from the center, a total of 202 dairy cows were examined near and after calving. Upon clinical investigation through observation, vaginoscopy and rectal palpation were implemented to diagnose the cases. Besides data record sheets of the center also roughly checked to measure parity number of the study animals considered.

*Up on follow-up examination:* regular follow-up was carried out on weekly basis on 130 selected pregnant dairy cows from the center and 11 from Kombolcha Town for any abnormality during pregnancy period, parturition and following parturition for about three weeks. During pregnancy animals were rectally palpated after 75 days of insemination and the parameters of reproductive tract including size of horn, uterine position, pelvic diameter and tonicity of uterus were examined. After calving cows has been clinically examined and rectally palpated on weekly basis for three week to determine uterine status, ovarian structures and reproductive problems until involution of uterus. Observation was made on retained fetal membrane (when retained longer than 12 hours after calving),

uterine discharge, metritis, abortion, pyometra, dystocia, anoestrous and repeat breeder.

#### 2.4. Sample Size and Sampling Method

This particular study, as a preliminary research on the center, will encompass all first calf heifers and cows that have good reproductive and productive records and their reproductive problems encountered during study period. 95% level of confidence interval and expected prevalence of 50% prevalence with desired absolute precision of 5% and simple random sampling method was used [17]. However for this purpose a total of 402 dairy cows (261 questionnaire survey and 141 regular follow-up examinations) were included under the study which was handled under different management system. Purposive and random sampling methods were employed on those animals which are at parturition and post-partum period during questionnaire survey and regular follow-up scrutiny.

#### 2.5. Data Management and Analysis

The collected data were entered in to Microsoft Excel Spread sheet and managed accordingly. The data is analyzed by SPSS version 16 statistical software. Both descriptive and analytical techniques were used for data analysis. The prevalence and the relative frequencies of reproductive health problems were determined as the proportion of affected

animals out of the total animals examined and the total number of cases, respectively. The association between dependent and independent factors (breed, parity, management practice and body condition score major reproductive health problems were analyzed using  $\chi^2$  (chi-square) technique. The degree of association between parity and reproductive problems and the association between body condition and reproductive problems were analyzed by using odd ratio.

### 3. Results

In this study, a total of 402 dairy cows were examined for major reproductive health problems by classifying the method of study as questionnaire survey and longitudinal study (regular follow up) (Table 1). Out of 261 cows that were scrutinized through owners questionnaire and instant visit, from the center and Kombolcha Town, 119 (45.6%) were diagnosed at least for one major reproductive health problems. In the same way, out of 141 cows which were under regular weekly follow up 40 (28.4%) of them were diagnosed to be positive for at least one of the major reproductive health problems. over all 159 (39.5%) cows were positive for at least one of the major reproductive health problems (Table 1).

**Table 1.** The prevalence rate of reproductive problems in and around the center.

| Method of study      | No. of cows examined | No. of cows positive (%) |
|----------------------|----------------------|--------------------------|
| Questionnaire survey | 261                  | 119 (45.6)               |
| Regular follow up    | 141                  | 40 (28.4)                |
| Total                | 402                  | 159 (39.5)               |

The major reproductive health problems identified during the study period were; retained fetal membrane (RFM), dystocia, metritis, abortion, milk fever, pyometra, uterine prolapse, repeat breeder and vaginal prolapse were being the most problems in the area in their order of prevalence compared with the others. The problems are depicted with their prevalence in the table below (Table 2).

**Table 2.** The relative occurrence of major reproductive health problems and their prevalence rate.

| Type of reproductiveProblems | Questionnaire survey No. (%) | Regular follow-upNo. (%) | Total (%)  |
|------------------------------|------------------------------|--------------------------|------------|
| RFM                          | 31 (11.87)                   | 9 (6.38)                 | 40 (10.0)  |
| Dystocia                     | 30 (11.49)                   | 7 (4.96)                 | 37 (9.2)   |
| Metritis                     | 16 (6.13)                    | 12 (8.5)                 | 28 (7)     |
| Abortion                     | 7 (2.68)                     | 10 (7.09)                | 17 (4.42)  |
| Milk fever                   | 15(5.76)                     | 0 (0.0)                  | 15 (3.73)  |
| Pyometra                     | 6 (2.29)                     | 2 (1.41)                 | 8 (2)      |
| Uterine prolapsed            | 7 (2.68)                     | 0 (0.0)                  | 7 (1.7)    |
| Repeat breeder               | 5 (1.95)                     | 0 (0.0)                  | 5 (1.24)   |
| Vaginal prolapsed            | 2 (0.76)                     | 0 (0.0)                  | 2 (0.49)   |
| Total                        | 119 (45.59)                  | 40 (28.36)               | 159 (39.5) |

From the five risk factors considered in this research, the association between age and reproductive health problems were assessed. As it is depicted on Table 3, as age increases almost the prevalence of all the three most important reproduction problems shown to decrease, particularly there

Comparison for the proportion of occurrence of one or more reproductive health disorder, showed as the higher prevalence of 41.9% for indigenous and 32.32% for cross breeds of dairy cows. However, in relation to breed there was non-statistically significant difference ( $P > 0.05$ ) in prevalence of the reproductive disorder.

was a significant association between age of 3- 5 years cow ( $p < 0.05$ , OR=5, CI(0.15,0.88))and metritis (Table 3).

The effect of parity (lactation stage) on the prevalence rate of reproductive problems was assessed and there was non-significant ( $P > 0.05$ ) association between prevalence rate of

reproductive problems and the parity of the individual dairy cow. The prevalence was higher in cows of parity < 3 (57.8%) as compared to cows with parity >3 (41.5%) (Table 3).

The reproductive problems were also assessed in relation to body condition score of the cows and the association were found to be statistically not significant ( $P > 0.05$ ) (Table 3).

**Table 3.** Factors associated with the occurrence of major clinical reproductive problems.

| Variables     | No. (%)    | Reproductive health problems |              |              |              |              |              |
|---------------|------------|------------------------------|--------------|--------------|--------------|--------------|--------------|
|               |            | RFM                          |              | Dystocia     |              | Metritis     |              |
|               |            | Positive (%)                 | Negative (%) | Positive (%) | Negative (%) | Positive (%) | Negative (%) |
| <b>Age</b>    | <b>402</b> |                              |              |              |              |              |              |
| 1 (3-5)       | 110        | 14 (12.72)                   | 96 (87.27)   | 13 (11.81)   | 97 (88.18)   | 14 (12.72)*  | 96 (87.27)   |
| 2 (5-7)       | 114        | 10 (8.77)                    | 104 (91.22)  | 9 (7.89)     | 105 (92.11)  | 5 (4.38)     | 109 (95.60)  |
| 3 (>7)        | 178        | 16 (8.98)                    | 162 (91.01)  | 15 (8.42)    | 163 (91.01)  | 9 (5.05)     | 169 (94.94)  |
| <b>Parity</b> | <b>402</b> |                              |              |              |              |              |              |
| < 3           | 234        | 25 (10.68)                   | 209 (89.31)  | 20 (8.54)    | 214 (91.45)  | 20 (8.54)    | 214 (91.45)  |
| > 3           | 168        | 15 (8.9)                     | 153 (91.07)  | 17 (10.11)   | 151 (89.88)  | 8 (4.76)     | 160 (95.23)  |
| <b>BCS</b>    | <b>402</b> |                              |              |              |              |              |              |
| < 3           | 290        | 30 (10.34)                   | 260 (89.65)  | 25 (8.62)    | 265 (91.37)  | 21 (7.24)    | 269 (92.75)  |
| >3            | 112        | 10 (8.92)                    | 102 (91.07)  | 12 (10.74)   | 100 (89.28)  | 7 (6.25)     | 105 (93.75)  |
| <b>HAC</b>    | <b>402</b> |                              |              |              |              |              |              |
| Good          | 365        | 125 (34.24)**                | 237 (64.93)  | 127 (34.79)  | 238 (65.20)  | 133 (36.43)  | 241 (66.02)  |
| Bad           | 37         | 23 (62.16)**                 | 17 (45.94)   | 21 (56.75)   | 16 (43.24)   | 15 (40.54)   | 13 (35.23)   |
| <b>MP</b>     | <b>402</b> |                              |              |              |              |              |              |
| Ext           | 295        | 0 (0.00)***                  | 295 (100)    | 2 (0.67)     | 293 (99.4)   | 0 (0.00)     | 295 (100)    |
| Semi-int      | 107        | 40 (37.4)***                 | 67 (62.6)    | 35 (32.8)    | 72 (67.3)    | 28 (26.2)    | 79 (73.4)    |

NB. Numbers with '\*\*' shows significant association between variables; Ext = Extensive, Semi-int = Semi-intensive

\* is the significant association between age and metritis ( $P = 0.02$ ); \*\* hygiene at calving and RFM ( $X^2 = 8.17$ ;  $P = 0.004$ ) and \*\*\* is the significant association between management practice (MP) and RFM ( $P = 0.00$ ).

Factors like hygiene practice at and around calving (HAC), was found to have an association with the occurrence of RFM ( $P < 0.05$ ) and hygiene practice. Statistical association indicates the presence of less exposure for RFM for animals kept at good hygienic status (OR = 8, CI (0.2, 0.76)) (Table 3).

Out of the total study animals 295 (75.4%) were kept under extensive management system and 107 (26.4%) of them were in intensive production system. When we correlate production system with the occurrence of reproductive health problems, a statistically significant association was found with RFM occurrence between the two management systems ( $p < 0.05$ ) (Table 3).

## 4. Discussions

In comparison relatively a lower prevalence (39.5%) rate of major clinical reproductive problems was obtained in this study when compared with the values reported by [18] (50.9%) in Holleta and [19] (74.8%) around Addis Ababa. The lower prevalence rate were reported by [20] (26.7%), [21] (26.7%) in Mekelle, [13] (31.6%) and [19] (34.89%) around Kombolcha town as compared with this study. This variation in prevalence rate could possibly be attributed to difference in management system, breeds of animals and environmental conditions.

The prevalence of dystocia, which is 9.2% recorded in this study agrees with the prevalence reported by [22] (9.61%). Lower incidence rate of 7.8%, 7.5%, 7%, 6.95%, 5.79% and 5.5% were also reported by [18] in Holleta and [23, 24, 25, 13, 26, 27] respectively. It is difficult to give

exact figures on the incidence of dystocia because it is influenced by several factors such as nutritional status, age and parity of the dam, breed of the sire and the dam [28]. Inseminating cows with semen collected from large sire together with age of cows mentioned as an important factor in inducing dystocia.

The prevalence of metritis was 7% which is in agreement with [29] around DebreZeit recorded the prevalence rate of 3.1%-9.9%. The higher prevalence rate were reported by [21, 30, 7, 22, 13, 26] with 16.6%, 18.7%, 15.5%, 11.5%, 16.63% and 11.5-13.6% respectively. Furthermore, the higher prevalence rate were reported by [31] (67%) and [32] (50%). The reason for this significant variation might possibly be due to the difference in management system, breed and environmental factor. Additionally, the possible factors involved with metritis include; RFM, injury of the reproductive tract (due to difficult calving or excessive force used to assist at calving), injury at the time of breeding and uterine treatment and contamination of the reproductive tract during calving period [33].

The prevalence rate of abortion (4.21%) recorded in this study was similar to the result of [7, 34, 29] having prevalence rate of 5.33%, 5.4% and 1.5- 7.8% reported by respectively. However, [35, 21, 27] were reported higher prevalence rate of 16.3%, 6.2% and 11.11% of abortion respectively. On the other way round, [7, 36, 19, 30] reported a prevalence rate of 2.23%, 3.19%, 2.2% and 3.19% respectively which were lower than the current finding. Moreover, [37] documented prevalence rate of abortion ranging from 0.4-10.6% suggesting breed, geographic, study

population, case definition and procedural differences as source of this differences. According to this study, the possible causes were poor management system, environment and disease condition.

Repeat breeder was also studied with a prevalence rate of 1.24% which is in agreement with the prevalence rate reported by [38] (3%) and [30] (3%) around Kombolcha town. In contrast, [7, 24, 34] reported a prevalence rate of 8.9%, 4.6% and 21.8% respectively. The lower prevalence rate reported in this research was due to management system and health care provided for animals kept in the ranch. Repeat breeding can be caused by a number of factors, including sub-fertile bulls, endocrine imbalance, malnutrition, reproductive tract infections and poor management practice such as wrong time of insemination or faulty heat detection, inappropriate semen handling and insemination techniques [3].

The prevalence rate of retained fetal membrane in this study was 10%. This result slightly disagrees prevalence reported in and around DebreZeit by [26] (14.28%), in central highlands of Ethiopia by [35] (7.1-28.9%) and in and around Holleta by [27] (16.7%). But it is equivalent with reported prevalence by [24] (10.6%). The variation in the incidence of RFM may be attributed to variation in predisposing factor in different site of study to which the animals are subjected to different condition, like; nutritional status and management. Furthermore, the increased risk factors for RFM with increased parity, twinning, induction and premature births and direct association of RFM with milk fever can have its own role for the different records of prevalence at different area [24].

Attention was also given for the prevalence of prolapse cases in and around the Guduru research center and was found to be 1.73% with uterine prolapse and 0.5% of the cases were vaginal prolapse. These were approximate with the research of [18, 30] with 1.9% and 1.28% respectively. The possible factor may attribute to forced traction of fetus at parturition, puerperal disease and nutritional deficiency.

The prevalence rate of milk fever (3.73%) reported in this study was due to the fact that the lack of enough food and supportive management taken to animals. In addition disease prevalence also considered as the major cause as it results in energy depletion which causes emaciation, depression, immune deficiency and finally difficulty to partured.

This study revealed the higher prevalence of reproductive health problems on indigenous breeds (41%) as compared to the cross breeds (36.36%). However, there was no significant association between different breeds ( $P > 0.05$ ) of cows. Crossbred found were having at most 50% exotic blood type and this will help them to cope up the tropical weather conditions and hence yield better result up on better management taken to them than indigenous breeds which found generally under extensive management system.

There was strong association between different age groups of cows and occurrence of metritis. Cows with the age category of 3-5 years were highly affected ( $P < 0.05$ ) (OR = 4) than others ( $> 5$  years of age). This is due to the fact that

as the animals age increase, their immunity to overcome disease condition became also increased.

The other reproductive problems obtained in this study with higher prevalence (58%) on primipara cows; with the absence of association (no statistical association between parity and reproductive health problems,  $P > 0.05$ ). This is similar to the previous findings [21, 23, 36, 24, 26, 7] and is possible due to the less adaptability of primipara cows to pregnancy and their less activities of their immunity against uterine infection that result in postpartum reproductive disease.

Body condition score was found to be non-significant statistically ( $P > 0.05$ ). Prevalence rate between different BCS showed; lean (score  $< 3$ ) (71.6%) and fat cows (score  $> 3$ ) (27.7%). This could be probably due to lean animals having less expensive force to expel out fetal membrane and hence secondary complications easily developed [24]. Moreover, animal with poor body condition may have poor defense mechanism. This prevalence difference further strengthened by the idea of [39] as lactation and uterine involution require energy; the energy used by this process must be sufficiently supplied. Otherwise, it will meet from the cows body reserve/fat.

## 5. Conclusion and Recommendations

A herd health program is critical in maintaining reproductive health and identifying potential problems in production and reproduction areas. In general, the cows in the center and Kombolchatown were affected by different reproductive health problems with poor management and production system. Thus, this particular study tried to point out the magnitude of major reproductive problems and their relative importance.

In line with the above conclusion the following recommendations are forwarded; in this study, the results obtained insured that direct association of problems of metritis with predisposing factors like age, RFM with hygiene around calving and with management practice. Therefore, controlling of predisposing factor and improvement of management practice were forwarded to limits the prevalence of such diseases.

## Author Contribution

AW: Conception of the research idea, designing Data collection, interpretation of the results and drafting the manuscript. JS: Data collection and drafting the manuscript. The author read and approved the final manuscript.

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