On-Farm Assessment of Reproductive and Productive Performances of Mpwapwa Cattle Breed and it's Crossbred in Low-Input Smallholders

Mercy M. Mabruck[1], Isaac P. Kashoma[2] and Mirende M. Kichuki[2]

[1]Department of Animal, Aquaculture and Range Sciences, College of Agriculture, Sokoine University of Agriculture, P.O. Box 3004, Morogoro, Tanzania.
[2]Department of Veterinary Surgery and Theriogenology, College of Veterinary and Medical Sciences, Sokoine University of Agriculture, P.O. Box 3020, Morogoro, Tanzania.

Corresponding author: mercy.mabruck@sua.ac.tz

SUMMARY

Productive and reproductive performance are key factors for successive and sustained livestock production. A cross sectional study was conducted at Mpwapwa district with the objective of assessing the productive and reproductive performances of Mpwapwa breed cattle and its crossbred maintained under low in-put smallholder farmers. A semi-structured questionnaire and face-to-face interview techniques were used to collect data on productive and reproductive performance. The collected data were analyzed using IBM SPSS Statistics software version 21. For productive performance, the average lactation length (LL) was 332 ± 16.7 days and the average milk yield per day (AMYD) was 3.08±1.11 liters. Significant differences ($p < 0.05$) in LL and AMYD was observed between herds supplemented with concentrate and those without supplements. Overall mean of calving interval (CI), age at first mating (AFM), age at first calving (AFC) and number of services per conception (NSC) were 17.5±6.6 months, 32.3±8.21months, 44.04±6.49 months and 1.23±0.14, respectively. Significance difference ($p < 0.05$) was observed in AFM between those who use only natural breeding method to those who use both breeding methods. The observed productive and reproductive performances of Mpwapwa breed and its crossbred is low compared to the target goal when it was established. Therefore, there is a prudent need for improvement of management practices to optimize the reproductive and productive performances of the Mpwapwa cattle maintained by smallholder farmers under low-input production system.

Keywords: Mpwapwa cattle breed, age at first calving, calving interval, lactation length, lactation yield, reproductive disorders.

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INTRODUCTION

Tanzania is predominantly rural, with about 65% of the population engaged in agriculture of which 33.0 % are engaged in crops and livestock, and 2.0 percent in livestock activities only (URT, 2021). The livestock industry in Tanzania is supported by many exceptional natural resources including diverse natural vegetation, extensive rangelands, and diversely resilient low productive livestock breeds. Furthermore, livestock is valuable in sustainable agriculture by providing manure and labour for increased productivity and therefore enhancing the well-being and increased income of farmers (MLFD, 2010). According to National Sample Census of Agriculture 2019/20, Tanzania has about 33.9 million cattle, where 33.8 million cattle and 143,000 cattle are owed by smallholder farmers and large-scale farms, respectively (URT, 2021). Conferring to the analysis of livestock sector (LSA) baseline Tanzania has the second-largest cattle population in Africa (NBS, 2021). Approximately 97% of Tanzania cattle

population is composed mainly of innate Tanzanian short horn zebu (TSHZ) (*Bos indicus*), where the remaining 3% is composed of exotic and cross breeds (MLFD, 2015).

Although indigenous TSHZ are environmentally hardy, adapted to withstand heat stress, drought, disease and parasites, their productivity and reproductivity are generally low: 18-24 months calving interval, calf mortality rate 30 - 40%, milk yield 300 - 400 liters per lactation, and mature weight of 200 - 350kg with carcass weight 100 - 175 kg (MLFD, 2015). To improve productivity of indigenous cattle breeds in Tanzania, strategies such as selective breeding, crossbreeding with exotic dairy breeds, artificial insemination, and establishment of livestock Multiplication units (LMUs) have been implemented to produce and distribute improved heifer and bull (Chawala *et al.,* 2017). Despite its great potential, cross breeding approach faces several challenges such as mis-match between genotype and production system with respect to environmental conditions (Gebreyohannes *et al.,* 2013).

Mpwapwa breed, an Indo-African composite dual-purpose breed, was established in 1958s to suit for milk and meat production in medium to low-input production environments (Kiwuwa and Kyomo, 1971; Rushalaza and Kasonta, 1993). The target of this breed was for cow to produce 2,300 kg of milk per lactation of 305days while steers producing a carcass of 230 kg in less than 4 years under medium to low-input production systems (Systard, 1990). Although the genetic composition is currently not well tracked (Syrstad, 1990), the breed had a genetic composition of 32% Red Sindhi, 30% Sahiwal, 19% Tanganyika Shorthorn Zebu (TSZ), 11% Boran, and 8% Bos taurus, mainly Ayrshire at the time of its development in 1958 it (Kiwuwa and Kyomo, 1971). Owing to good production performance (milk and meat yield compared to TSHZ), disease resistance, and the ability of the bulls to be used for draught power, Mpwapwa breed has been widely accepted by the community around the central zone of Tanzania (Komwihangilo *et al.,* 2009). As from 1999 onwards, multiplication efforts to increase the population of the breed have been undertaken involving multiplication of the pure Mpwapwa breed and escalation of the animal by backcrossing the present pure Mpwapwa with Boran and Sahiwal (Bwire *et al.,* 2005).

Despite the efforts of increasing the number of Mpwapwa breed cattle to low-input smallholders, information on the production and reproduction performance of these animals reared by smallholders under low-input system is inadequate. This is in contrast to the animals kept at nuclear point (Breeding center of TALIRI Mpwapwa) with has high-input system, where extensive studies on phenotypic, genetic, and economic parameters have been reported. Therefore, the aim of this study was to benchmark the current productive and reproductive performance of mpwapwa breed and its crossbred reared in smallholders under low-input systems.

MATERIALS AND METHODS

Description of the Study Area

This study was carried out in seven administrative wards of Mpwapwa district, Dodoma region, Tanzania (Figure 1). Mpwapwa district is among seven districts of Dodoma region which is predominantly arid, lying between 915 to 1,200 meters above sea level, with spontaneous mountain chains in the southern and western parts. It is situated between latitudes 6°00" and 7°30" South of the equator and between longitude 35°45" and 37°00" East of Greenwich. The district borders Kilosa and Gaito Districts on the Eastern part, Kongwa District on the Northern part, Chamwino District on the Western area and Kilolo District on the South. The district has a dry savannah type of climate characterized average daily temperature ranging from 24 – 29ºC. The climate is further divided into rain and dry seasons, with rainy season starting from December to April having rainfall of between 600 – 1200 mm where the mountainous areas receiving the heavy rains of up to 1,200 mm per annum. Mpwapwa has estimated population of 403,247 people, with density population of approximately 54.09 people per square kilometer. The district economy is predominantly agrarian with more than 80% of residents engaged in subsistence agriculture. Major crops cultivated include maize, sorghum, millet, groundnuts and sunflower supplemented by livestock keeping which also play a significant role in supporting household livelihood, particularly the rearing of cattle, goats, sheep and poultry.

Study design

A cross sectional study design was conducted from September, 2021 to April, 2022 to gather information concerning the productive and reproductive performance of Mpwapwa cattle breed and its crosses

kept by smallholders in seven administrative wards of Mpwapwa district namely; Massa, Chipogolo, Belege, Mazae, Ving'hawe, Kibakwe and Pwaga (Figure 1).

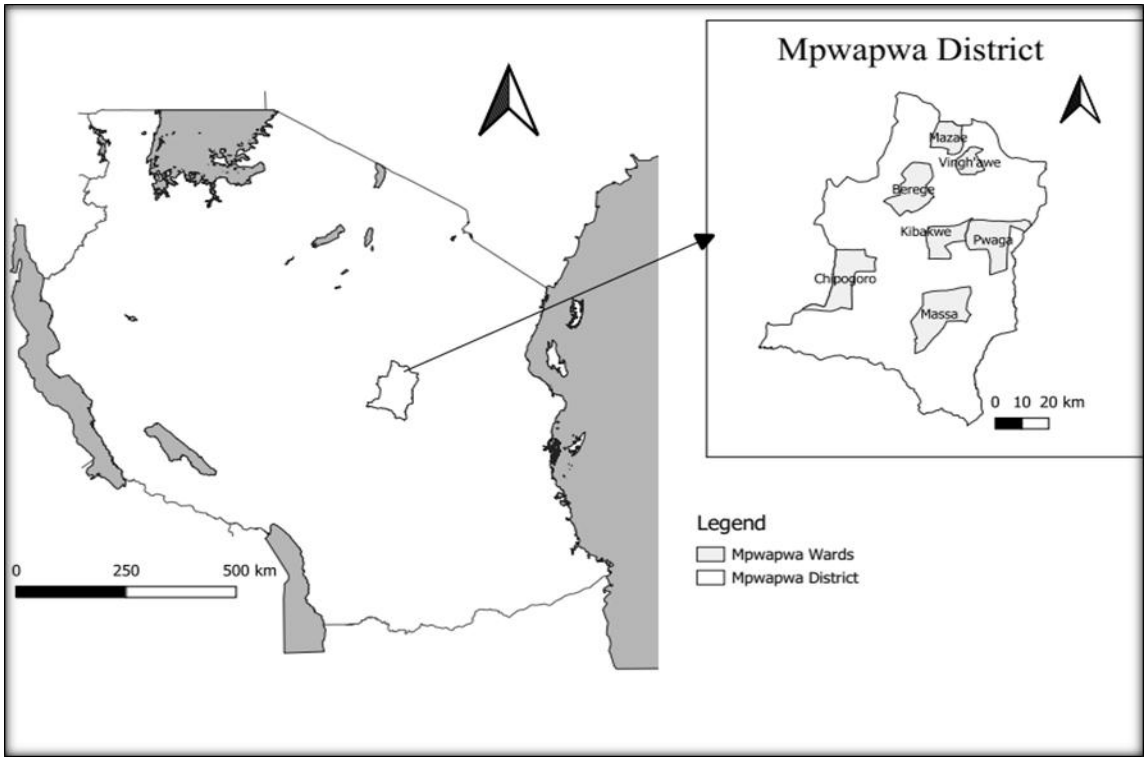

Figure 1: Map of the study area

Data collection

A total of 100 farmers keeping approximately 986 Mpwapwa cattle and its crosses at different parities (one up to six) were purposely selected for interview using pre-tested structured questionnaire administered through face-to-face interviews. The information captured included demographic data (personal information, gender, age, occupation, family size, educational level) and general animal husbandry. Animal's productive data such as lactation length (LL) and average milk yield per day (AMYPD) were collected. For reproductive performance, information on the number of services per conception (NSC), age at first heat (AFH), age at first calving (AFC) and calving interval (CI) were gathered. Other collected data included reproductive health problems such as calf mortality, repeat breeding, uterine prolapse, dystocia, abortion, retained placenta and other post-parturient conditions. The traits studied were as previously defined and described by Miah et al (2018) and Hagan et al (2022):

Age at first calving is the age a cow had its first calf, expressed in months. Age at first service is the age at which the heifer had its first mating in months. Calving interval is the time interval between two successive calving, expressed in months. Number of services per conception is the average number of services resulting in conception. Lactation length is the time of period from when a cow starts to secrete milk after parturition to the time of drying off, expressed in days. Average milk yield per day is the average milk yield per cow per day recorded during the lactation period, expressed in kilograms (liters).

Data management and analysis

The collected raw data were first entered into an Excel sheet, cleaned, coded, and then imported into IBM SPSS Statistics software version 21 for analysis. Descriptive statistics such as frequency, percentage, means and standard deviation were analyzed and presented in the form of table and figure. Furthermore, ANOVA tests were used to examine differences between levels of significance between the variables. Differences were considered to be significant at $p < 0.05$.

RESULTS

Demography of the respondents.

Majority of respondents (94%) were male with almost all (98%) being married. The respondents' education level spanned from informal education, primary school, secondary school and college education with distribution percentages of 27%, 66%, 6% and 1%, respectively. Most farmers (76%) had long experience of keeping livestock for more than 15 years while few (17%) had experience of 10 to 15 years.

Cattle farming experience

It was generally observed that 76% of the farmers had more than 20 Mpwapwa cattle herds and its crosses in their farms with about 50% of all farmers had >5 family members participating in livestock activities (Table 1). Almost all farmers had different motives for engaging in cattle keeping activities including; economic enterprise, supplementary enterprise, home milk consumption and hobby where majority of them had more than one motive with the economic enterprise as a leading motive as reported by 82% farmers. Majority (93%) of farmers perform extensive feeding system by allowing their animals to graze in communal areas whereas the minority (7%) practice both grazing, stall feeding and tethering systems. Supplementary concentrate feeding to all animals was practiced by small proportion (37%) of the respondents whereas 54.1% farmers give supplements only to lactating animals. Following the seasonal variations in availability of feed, only 9% of farmer either had established pasture, buying from vendor or use crop residual during dry season, 67% farmers relay only on communal grazing on natural pasture and the remaining 24% used both natural pastures, established pastures, buy from vendors or crop residues. Feed conservation was practiced by 63% of farmers preserving as standing hay. Majority (83%) of farmers gets animal health services from government animal health officer paying visits only when needed (86%).

Table 1. Demographic characteristics of respondents

Parameters	Categories	Percentage (%)
Farming experience	1-4.5	6%
	5-9.5	5%
	10-15	17%
	>15	72%
Cattle population	1-5	6%
	6-10	9%
	10-20	9%
	>20	76%
Feeding system	Grazing	93%
	Grazing and stall feeding	2%
	Grazing and tethering	5%
Supplementation	Concentrate supplement	37%
	No supplement	63%
Supplement group	Lactating animals	20%
	Pregnancy animals, calves and heifer	8%
	Bulls	3%
	Sick animals	3%
	All	3%
	No Supplement	63%

*farming experience in years and cattle population in numbers

Reproductive performance

The reported number of calves which Mpwapwa cattle breed and its crosses can produce per reproductive life span ranged from 4 - 6 as reported by majority (83%) of the respondents. Regarding the calving season, 63% of farmers reported to have their

animals calving during rainy season, 20% in dry season whereas 17% observed their animals calving in all seasons of the year. Majority of farmers (97%) use natural breeding system with minority (3%) acknowledging to use artificial insemination at least once in their farming practices. More than half number of farmers (63%) practice selection of animals for breeding purposes. The criteria used for selection of breeding bulls include physical appearance, pedigree history and service efficiency. With regard to breeding cows, most farmers (82%) had no selection criteria and few (18%) selecting based on phenotypic characteristics including animal pedigree, physical appearance and growth performance. Thirty-seven percent (37%) of farmers exclusively admitted to own bulls whereas the rest get their cows serviced from either neighbor's bulls or communal grazing bulls. Majority (70%) of farmers submit heifer for breeding only when exhibit signs of estrus. There was no specific voluntary period for cow from parturition to first mating as majority (81%) of farmers admitted to submit their cows for breeding once the signs of estrous observed as mostly both bulls and cows run together all the time.

The recorded average age at first mating of Mpwapwa cattle breed and its crosses was 32.3±8.21 months (Figure 2) with most of heifers (88%) reaching puberty between 24 and 36 months of age. There was a significantly low (p = 0.011) age at first mating to farmers practicing only natural breeding method compare to those using both natural and artificial breeding method. Furthermore, the study revealed that the average age at first calving (AFC) of Mpwapwa breed and its crosses kept under low-input was 44.04±6.49 months (Figure 2) with the majority of heifer (87%) calving for the first time between 36 and 48 month of age. The mean calving interval (CI) for animals obtained from the current study was 17.5±6.6 months (Figure 2) with 96% of cows having between 12 to 24 months of CI. The length in days from calving to first estrous ranged approximately between 60 – 90 days. With the exception of cows with reproductive disorders which differed ($p < 0.05$) from cows with normal postpartum period, the number of days between calving and first estrous/mating were not different between parities. The mean number of services per conception was 1.23 ± 0.14 (range 1 – 3) with a coefficient of variation of 23.1%. Numbers of services per conception were lowest among primiparous than in multiparous and tended to increase ($p > 0.05$) with parity.

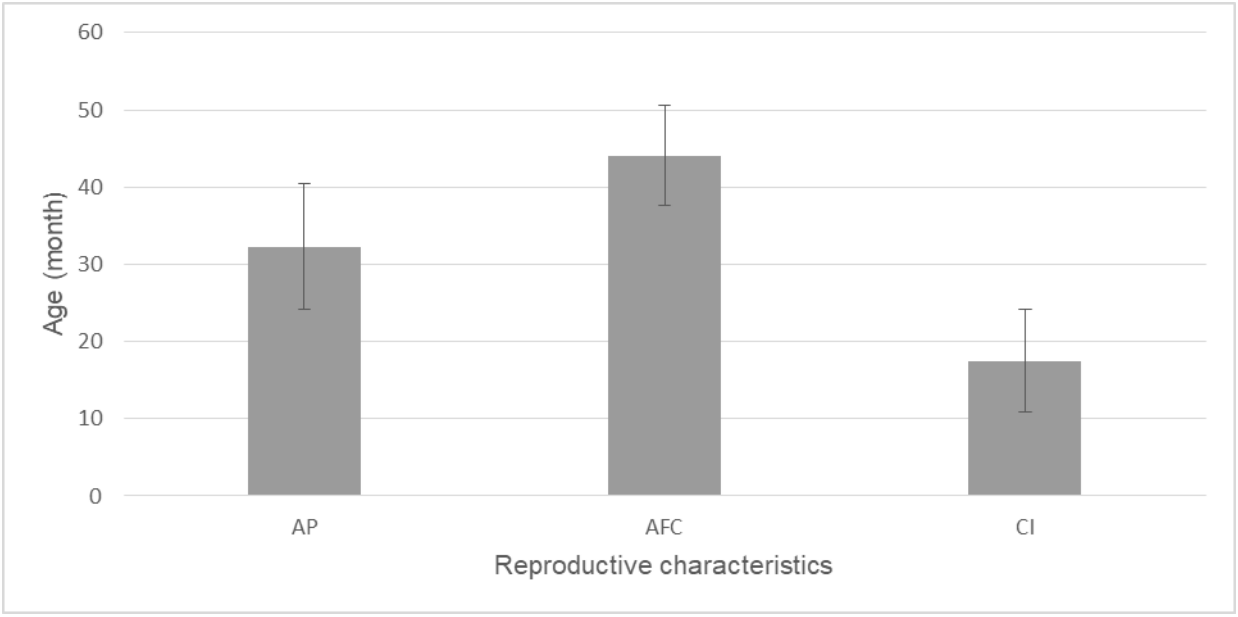

Figure 2. The mean and standard deviation of: AP (age at puberty), AFC (age at first calving) and CI (calving interval) of Mpwapwa breed and its crossbred at Mpwapwa district.

Productive performance

High percentage of farmers (49%) responded to start milking their cow one month after calving, 26% after one week, 2% after 2 weeks while 13% admitted to start milking the cows two or more months after calving. Nevertheless, all farmers reported to stop

milking their cows only when the animal stops producing milk. The majority (74%) of cows in the study area had an average LL of 6-12 months (332 ± 16.7 days) while few farmers (26%) reported LL of less than 6 months. Nonetheless, no significant (p = 0.719) seasonal difference was reported in LL between cows calved during rainy and dry season. But, significant difference ($p < 0.05$) was observed in LL in relation to feeding management; where herd receiving concentrate supplement and those conserving feeds had high LL compare to those that did not receive concentrate supplement as well as those who did not conserve feed. The average milk yield per day (AMYD) of cows under this study was 3.08±1.11 liters with higher milk production (p=0.415) observed during rainy season. There were also significant difference (p=0.001) in milk yield between herd that received concentrate supplement compare to herd that did not receive concentrate supplementation. Moreover, this study revealed a significance (p=0.045) high average milk yield in farmers practice both natural and artificial breeding methods compare to those who use only natural breeding method. Although selection for breeding purpose did not show significance difference between those who select animal prior breeding there was slightly increase (p=0.174) in milk production in herds where selection was conducted. Furthermore, 87% of farmer observed the difference in milk yield between non-pregnant and in-calf cows where non-pregnant cows had high milk production compare to pregnant one of the same parities.

Cattle production challenges

In the current study, 100% of respondents reported to have no observed congenital abnormalities in their animals, whereas 40% of farmers experienced non-reproductive challenge in cattle they keep (Figure 3). Nearly twenty percent of early calf mortality (neonatal death) was observed by most (51%) farmers, 30-40% by few (9%) farmers while none calf neonatal death was reported by moderate percentage (40%) of farmers. Diseases (calf scours and tick borne disease), hunger and toxicity were the most mentioned causes of calves' death. Among the major reproductive health problems reported in this study includes retained fetal membrane (24.0%), anoestrus (20.0%), abortion (17.0%), endometritis (12.0%), repeat breeder (9.0%), dystocia (8.0%), pyometra (5.0%), and uterine and/or vaginal prolapse (2.0%). The most sited side effects associated with postpartum reproductive disorders included reduced milk production (26.0%), extended return to estrous (20.0%), and death of animals (3.0%). Only few farmers consulted veterinarian for treatment of endometritis (8.0%), repeat breeding syndrome (4.0%), retained fetal membrane (17.0%) and abortion (2.0%). Feeding to dogs was the major method of disposing aborted fetuses (15.0%) and retained fetal membranes (25.0%).

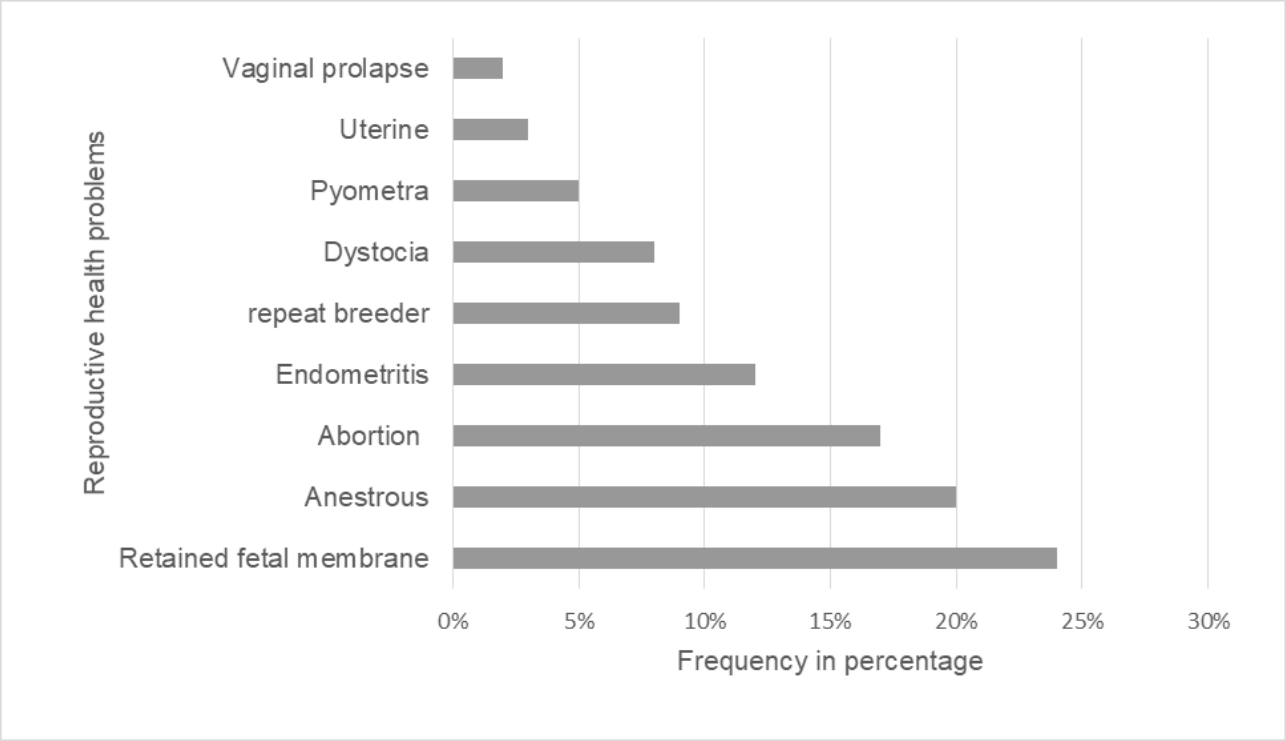

Figure 3. Reproductive health problems of Mpwapwa cattle breed and it's crossbred under farmers' condition.

DISCUSSION

The average age at first mating (32.3±8.16 months) from the current study is comparable with the range of 742-1120 days (26.5-40.12 months) and 24-36 months previously reported for Mpwapwa breed (Kanuya *et al.*, 1993) and Mpwapwa crosses (Komwihangilo *et al.*, 2009). However, the mean age at first mating reported in this study is higher than that of 24.30±8.01 months reported in Zebu X Holstein-Friesian Crossbred Dairy Cows in Ethiopia (Duguma *et al.*, 2012) but shorter than 36.8 ± 0.8 months reported in Friesian crosses kept in Ethiopian ranches (Gebeyehu *et al*., 2005). The disparities in age at first mating of between Mpwapwa cattle and other studies might be due to different genetic compositions between animals and managemental factors. A considerable delay in mating of heifer for the first time has a serious economic impact to the animal directly through reduced calf crop and milk yield per lifetime.

The occurrence of peak calving between December and April implies that most conceptions took place between April and July of the previous year. This is the period of the year when temperatures in the study area are relatively cool, some natural grass for grazing are plenty from the preceding rainy season, and thus animals have good body condition and are likely fertile (Abera *et al*., 2021). Previous studies (Knopf *et al.*, 2000; Madibela *et al.*, 2001; Kanuya *et al.*, 2006) reported similar trend of calving in different indigenous breeds of cattle. This seasonal pattern of conception and calving could be an adaptive physiological mechanism by the indigenous animals so that calving occurs at a time of plentiful nutrition including easy availability of drinking water. However, this seasonal calving pattern leads to uneven milk availability along the year.

Age at first calving (AFC) has economic impact to both productive and reproductive life as it determines the number of calf-crop and milk yields lifetime of the animal, and indirectly influences on cost invested in for up-bringing (Gebrekidan *et al*., 2012). In this study, AFC was 44.04±6.48 months for mpwapwa breed and its crosses. The AFC in this study is higher than the 33 ±9.7 months observed in Mpwapwa breed reared by small holder farmer around Berege ward, Mpwapwa district (Rushalaza and Kasonta, 1993), and 40.2 months for Mpwapwa cattle reared at nuclear point, TALIRI-Mpwapwa (Mabruck and

Kashoma, 2022). However, our findings are almost similar to 40.2 and 45.6 months (1383 days) reported in 1987 for Mpwapwa breed cows as reared at TALIRI - Mpwapwa (Katyega, 1987; Mkonyi, (1982). Similarly, higher average age at first calving 4.3 ± 3.3 years have been reported in Tarime Zebu Cattle (Chenyambuga *et al.,* 2008) and 50 ± 1.3 months in Tanzania shorthorn zebu/Fipa cattle (Mwambene *et al.,* 2012). Notably, lower AFC of 31.3-36.6 months of have been reported in Tropical crossbred heifers (Asimwe and Kifaro, 2007; Yifat *et al*., 2009) and 32 months of Mpwapwa breed reared on station at TALIRI, Mpwapwa, Tanzania (Chitawala *et al*., 2017).

The variations of AFC reported for mpwapwa cattle breed and its crosses could be attributable to many factors such as nutrition level, genetic constitution and management factors leading to poor conception rate of heifers that tend to remain in the herd for a long time. The breeding protocol for Mpwapwa cattle ever-since the breed was established stipulated that heifers that weigh less than 200 kg at the age of two to be culled and not used for breeding (Bwire *et al.,* 2005). However, this has not been practiced by smallholders as no such knowledge on the farmers as a result heifer that could not meet the stipulated criterion were likely to be retained for breeding.

The number of services per conception (NSC) mainly depends on mating system used, it is lower under uncontrolled natural breeding and higher in hand-mating or artificial insemination practices (Abebe, 2024). In this study, the overall mean NSC 1.23 ± 0.14 (range 1 – 3) which had a significant ($p>0.05$) increase with parity (few services in primiparous and more in multiparous animals). Overall, NSC was comparable to results reported by other researcher in Ethiopia (1.34 – 2.2) for indigenous cows (Abrha *et al.,* 2020) and in naturally and artificially inseminated Boran cattle (1.53 and 1.71) kept under ranch conditions in Tanzania (Mwatawala and Kifaro, 2009). Nevertheless, other researchers in Tanzania (Ngou and Kashoma, 2015; Kashoma *et al.,* 2015) reported relatively higher (1.8 - 2.5) NSC in dairy crossbreds. Similarly, high NSC (1.54 – 1.8) have been reported in Ethiopian dairy cross breed (Tadesse *et al*., 2010; Kumar *et al*., 2014). The significant effect of parity on NSC observed in this study was in consistent with other studies (Demeke *et al.,* 2004; Mwatawala and Kifaro, 2009; Ngou and Kashoma, 2015; Kashoma *et al.,* 2015) where it had been observed that primiparous animals were more efficient than multiparous cow with respect to reproduction. The variations in NSC reported by different researchers may be associated with many factors including estrous detection method used, availability of breeding bulls or AI services, breeding system used (natural versus artificial insemination), and nutritional status of cows at time of service.

The overall mean CI of 17.5±6.6 months observed in the current study is similar to 15-18 months and 16.4±3.23 months and which were previously reported by Komwihangilo *et al*. (2009) and Rushalaza and Kasonta, (1993), respectively, in Mpwapwa cattle breed and its crosses kept in smallholders. Furthermore, the CI obtained in this study is similar to 17.6 months and a range of 12 to 24 (19.92 ± 5.64) months previously reported in Mpwapwa breed kept on station at TALIRI – Mpwapwa (Chawala *et al*., 2017; Mabruck and Kashoma, 2022), and 17.6 ± 5.1 months of CI reported in Tarime Zebu Cattle (Chenyambuga *et al.,* 2008). However, our CI finding is higher than that of 409 days (13.5 months) and 447 days (14.7 months) previously reported by Katyega, (1987) and Das *et al,* (1986), respectively in Mpwapwa cattle breed. Remarkably, (lower CI of 15.5 ± 0.6 months has been reported in indigenous Tanzania shorthorn zebu (Fipa cattle) in three districts of southwestern highlands of Tanzania (Mwambene *et al.,* 2012). The variation in calving interval may be associated with many factors such as inability of the farmer to detect heat, early embryonic mortality, failure by the farmers to obtain the breeding bull at the correct time and some level of infertility due to moderate under nutrition.

The mean daily yield at peak (3.08±1.11 liters) reported in this study is lower than the previous results reported by Komwihangilo *et al*. (2009) of 4 to 6 litters and Rushalaza and Kasonta, (1993) of 5.5±1.1 litters from Mpwapwa breed and its crosses both kept under smallholder farming system. The cow's average milk yield per day findings reported here also is lower than 6.9±0.45 liters and 8.6±0.54 liters from purebred and crossbred Mpwapwa cattle, respectively (Mejia *et al.,* 1998) kept under high-input management system of TALIRI, Mpwapwa. However, the reported average milk production/cow/day 3.08 liters is higher than the 2 - 3 liters produced by Tanzania shorthorn zebu (Chenyambuga *et al.,* 2008; Mwambene *et al.,* 2012; Msanga *et al.,* 2012) and 2.02±0.48 liters for Boran

cattle breed (Bayssa *et al.*, 2021). The difference in milk yield may be as a consequence of genetic, nutrition, season of calving, parity, management, environment, and their interactions since have significant effect on milk yield (Kumar *et al.*, 2014).

The overall number of days in milk (average lactation length) of 332 ± 16.7 days reported in the present study is comparable with 300 ±17 days observed previously by Rushalaza and Kasonta, (1993) in Mpwapwa breed kept in low-input under smallholders. However, our findings are higher than that of 250 days reported by Komwihangilo *et al.* (2009), 288 days (Katyega 1987), 271 days (Chawala *et al.*, 2017), 228 days (Das *et al.*, 1999), 209 days (Mchau, 1988) and 237.72 ±71.20 days (Mabruck and Kashoma, 2022) both in Mpwapwa cattle breed and its crosses. Furthermore, the LL observed in the present study was within the range of 326 - 400 days reported for crossbred cows in smallholder dairy farms in sub-Saharan Africa (Chenyambuga and Mseleko, 2009; Gebreyohannes *et al.*, 2013; Ngou and Kashoma, 2015). The probable reasons for variation in LL might be genetic composition, nutrition, environmental and management systems where animals kept.

Postpartum health disorders have a carryover effect on animal's performance as their associated with reduced milk yield, reduce pregnancy rates, impair conceptus development, and increase embryo losses (Macmillan *et al.*, 2021). In this study, retained fetal membrane, anestrous abortions, endometritis, repeat breeder, dystocia, pyometra, uterine and vaginal prolapse were the major reproductive problems mentioned by the respondents. Our findings on postpartum reproductive disorders are comparable with the observations reported elsewhere (Swai *et al.*, 2005; Kashoma and Ngou, 2021; Dawit and Fesseha, 2020; Misebo *et al.*, 2018; Wagari *et al.*, 2016; Molalegne *et al.*, 2011; Kifle and Moges, 2016). However, variations in the occurrences of the reproductive disorders are likely to occur and attributed with the presence of predisposing factors such as breeding variation, nutritional status of animals, geographical location, and management factors.

Also, we investigated mortality rate in Mpwapwa breed and its crosses during their first 6 months of life and identified the main causes of death and observe the calf mortality rate of about 17% per 100 animal risk in a year where infectious diseases, hunger and toxicity were the most mentioned causes of calves' death. Similar mortality rates have been reported among zebu calves in Tanzania (Kanuya *et al.*, 2006; Swai *et al.*, 2009) and Kenya (Thumbi *et al.*, 2013). In sub-Saharan Africa, pre-weaning calf mortality of 15 to 35% is typical on many dairy farms with infectious diseases being the major risk factor (Muraguri *et al.*, 2005; Tesfaye, 2019; Alemu *et al.*, 2022). From our finding and others, it is evident that although Mpwapwa cattle are relatively resistance to diseases as compared to exotic breeds, calf mortality is high and possibly is responsible for sluggish country-wide spreading of the breed. Retained placenta (24%) and anoestrus (20%) were the highly prevalent reproductive disorder as compared to abortion, endometritis repeat breeding, dystocia, pyometra, and uterine and/or vaginal prolapse. Retained placenta is among of the major calving related problems posing a great risk to reproduction efficiency of the dairy cows (Swai *et al*., 2005; Akirso and Abera, 2020), and is likely to be associated with nutritional factors and other management problems.

In general, current productive and reproductive performances of mpwapwa breed and its crosses is low compare to the target goal of this breed. Poor management practices (poor nutrition, poor animal health care, poor housing) is the leading factor for the current low performances of mpwapwa breed and its cross breed. The government and non-government organization should work together to ensure proper and regular extension and health services together with multiplication and distribution of pure Mpwapwa breed, so as to optimize the performance of Mpwapwa breed cattle on farm in order to improve life standard of farmers.

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CONFLICT OF INTEREST DECLARATION

The authors of this paper declare that there is no conflict of interest. They confirm that the order of listing authors has been agreed by them and the manuscript has been read and approved by all authors.

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