

# Improving the Reproductive Efficiency of Dairy Cows through Double-Prostaglandin Hormone Injection in Gamo Zone, SNNP

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## Abstract

The study was aimed with the objective to evaluate on-farm response and conception rate by double injection of prostaglandin hormone to induce cows' oestrus in Chench and Arbaminch Zuria districts. The data were analyzed by employing simple descriptive statistics (frequency and percent) to present oestrus response and conception rate. The current findings revealed that the overall response and conception rate were 71.64% and 49.92%, respectively. However, both the response and conception rate to hormone injection were higher in Chench district (72.72% and 56.25%, respectively) than in Arbaminch Zuria (69.56% and 31.25%, respectively) district. The variation may be attributed with agro-ecology difference since Chench district was highland where as Arbaminch Zuria was considered as lowland. From the current result, cconception rate was lower than the response rate. This could be associated with heat detection problems of farmers, timing of insemination and poor husbandry practice of cows. Hence, choices of technically right and practically feasible protocol under on-farm conditions were essential to increase the response and conception rate.

**Keywords:** Hormone injection, oestrus synchronization, Gamo zone

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## 1. Introduction

In Ethiopia, the total number of cattle estimated to be 60 million. Out of this, about 98.66% constitutes local cattle and the remaining 1.33% is exotic and/or hybrid (CSA, 2018). Milk and meat are the main purposes for which cattle are kept for. However, productive and reproductive performance of cattle is influenced by feed, breed, absence of genetic improvement interventions, low level of inputs, disease and traditional husbandry practice as well as high environmental stress on which they are inhabited (Perera, 1999; Azage *et al.*, 2010). Moreover, the reproductive performance of the breeding female is probably the most important factor that is a prerequisite for sustainable dairy production system and influencing the productivity (Kiwuwa *et al.*, 1983).

Oestrous synchronization is a key assisted reproductive technology used to induce oestrus to bring a large percentage of a group of females into oestrus at a short, predetermined time (Rahman *et al.*, 2008; Gizaw *et al.*, 2016). There are several oestrus synchronization protocols developed to enhance cattle reproductive efficiency. However, the choice of hormone and estrus synchronization protocols depend on cost effectiveness, ease of application, and resultant fertility (Fierro *et al.*, 2013). The most common hormone for synchronization is prostaglandin (PGF<sub>2α</sub>) to inject animals and breed those that come into heat. Prostaglandin can be injected either in single or double dose. For half of decade, single dose prostaglandin protocol has been carried out for on-farm oestrous synchronization campaign in the country. But the rate of conception is far below 50%, which is 39.3% under regular development intervention due to lack of close follow-up of AI technicians who treat and inseminate large number of cows and lack of skill to detect functioning CL (corpu-lutum) results in inappropriate time of hormone administration (Gizaw, 2016). However, double injection consistently results in higher oestrus response rates than single injection in 11 days apart. By so doing, almost all the animals would be with sure functional CL regress (Mel, 2004; Girma, 2008; Kefyalew and Addis, 2015; Gizaw *et al.*, 2016). Gamo zone consists a large number of highland and lowland area cattle. However, the efficiency of oestrus synchronization by double injection hasn't studied yet. Therefore, the current research was aimed with the objective of to evaluate the on-farm response and conception rate by double shot of prostaglandin hormone to induce cows' oestrus.

## 2. Material and Method

### 2.1 Description of the study areas

The study was conducted in Chench and Arbaminch-Zuria districts of Gamo zone. Chench is Bordered on the south by Arbaminch Zuria, on the west by Dita, on the north by Kucha and on the east by Mirab Abaya. Arbaminch-Zuria has a longitude and latitude of 6°00'N 37°35'E and elevation of 1285 meters above sea level. The agro-ecology is considered as lowland area. Chench has a longitude and latitude of 6°15'N 37°34'E and elevation of 2732 meters above sea level. On the other hand, Arbaminch-Zuria is bordered on the south by the Dirashe, on the west by Bonke, on the north by Dita and Chench, on the north east by Mirab Abaya, on the east

by the Oromiya Region, and on the southeast by the Amaro Special Woreda. Chenchha is one of the highland woredas in Gamo zone. The two districts are characterized as mixed farming system.

## 2.2 Selection of experimental animals

From the Gamo zone, two sites (Arbaminch Zuria and Chenchha) were selected purposively based on proximity to animal handling crush and cattle population. About 87 breeding cows (33 from Arbaminch Zuria and 54 from Chenchha) were selected randomly. The females which were diagnosed to be cycling with presence of a functional CL was determined through rectal palpation by AI technician were injected (2 ml) PGF2 $\alpha$  (Synchromate, Bremer Pharma GMBH, Germany, 1 ml solution of Synchromate contains cloprostenol 0.263 mg equal to cloprostenol 0.250 mg) intramuscular. The protocol used for the experiment was Double injection of Prostaglandin at 11 days interval, heat detection and AI.

## 2.3 Data collection

Data on number of the cows presented, location, date and time of hormone treatment, date and time of oestrus detection, date and time of artificial insemination, conception rate (pregnancy diagnosis was carried out at three months of post artificial insemination by rectal palpation) and delivery rate were recorded.

## 2.4 Data analysis

Simple descriptive statistics (frequency and percent) was employed to present oestrus response and conception rate. Oestrus response rate (Number of cow showed oestrus/ Number of cows treated multiplied by 100) and conception rate (No. of cows/heifers pregnant / No. of cows/heifers inseminated multiplied by 100) were calculated.

## 3. Results and Discussion

### 3.1 Hormone response

The number of cows administered with hormone, cows responded to hormone injection, cows inseminated and conceived were presented in table 1. The overall response rate of the present study was about 71.64%. However, the response to hormone injection was higher in Chenchha district (72.72%) than Arbaminch Zuria (69.56%) district. According to other findings conducted in other regions of the country, the present hormone response was higher than that of Oromia region (41.7%) (Bainesagne, 2015) whereas lower than the report of Tigray region (93.3%) (Tadesse, 2015; Gizaw *et al.*, 2016). According to the report of Tegegn and Zelalem (2017), low response rate (63.64%) was obtained by single administration of the hormone in Mizan Aman and Bench Maji zones.

Table 1. The percent of cows injected, responded and inseminated and conceived in two districts.

	Arbaminch zuria		Chenchha		Overall	
	N	%	N	%	N	%
<b>Cows administered with hormone</b>	33		54		87	
<b>Cows responded and inseminated</b>	26	69.56	52	72.72	78	71.64
<b>Cows conceived</b>	15	31.25	28	56.25	43	47.92
<b>Reproductive wastage</b>	21	68.75	24	43.75	45	52.08

N= number of observation and % = percent

### 3.2 Conception rate

The number of cows conceived was presented in Table 1. The overall conception rate of the current study was about 49.92%. However, the conception rate was higher in Chenchha district (56.25%) than Arbaminch Zuria (31.25%) district. The variation may be attributed with agro-ecology difference since Chenchha district was highland whereas Arbaminch Zuria was considered as lowland. The current conception rate was in line with the findings in Tigray region in which the conception rate was 52.9% (Tadesse, 2015). However, lower conception rate (13.58%) was reported by Tegegne and Zelalem (2017) by single shot. Which could be associated with heat detection problem of farmers and AI technician, timing of insemination and poor husbandry practice (Azage *et al.*, 2012)

### 3.3 Reproductive wastage

The percent of reproductive wastage was indicated in Table 1. The overall reproductive wastage in the current finding was about 52.08%. However, the reproductive wastage was lower in Chenchha district (43.75%) than Arbaminch Zuria (68.75%) district. This high reproductive wastage may be due to weak heat sign detection, time of insemination, AI technician skill, environment and status of the cows.

#### 4. Conclusion and Recommendation

According to the present study, cows come to heat sign and conceived within short period of time. However, low conception rate and high reproductive wastage was observed. This could be attributed with time of insemination, skill of AI technician and different agro-ecology. Hence, further on-farm comparative research was expected for feasibility study and for increased response and conception rate by using different hormone protocols at different environmental conditions.

#### Conflict of Interest

The authors declared that there is no conflict of interests.

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