

<Case Report>

Artificial Insemination and Embryo Transfer Project to Foster Mongolia Dairy Industry

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ABSTRACT

Mongolia has 80% livestock of total agriculture industry, 170,000 farms are engaged, 2,500,000 of cows that were beef and dairy cows are raised. Despite of Mongolian has great application with milk, there are not clear differences between cow and dairy cattle, and the production of milk is also low. But the milk suppliers are varied (horse, sheep, goat, etc), so that the total milk production is 500 thousand ton per year. It's really considerable to improve the breed of owing to many problems with big differences among milk qualities. For carrying out for first year project, artificial insemination project was operated with 3rd grade Holstein semen that were imported from S. Korea, and initiation and field training were also carried out through appropriate AI technique we developed for Mongolia environment. Local information research and MOU conclusion were done with professor D. Altangerel in May 10th~13th, 2009, and development for AI technique and AI equipments were supplied for Mongolia breeding and natural environment in July 10th~17th in 2009. All cows were treated by synchronization for AI. To do this, PGF_{2α} injection were treated for luteal phase cow, if it wouldn't work, try again after 11 days. After confirmation of estrus, AI and AI training were carried out with sperm injection in the uterus or cervix by rectum-vagina method which is common worldwide, the most effective artificial insemination technique. If cows were return to next estrus cycle, second AI was carried out about approximately 21 days after artificial insemination. After 2 months, all cows not showing return estrus should be taken pregnancy test. Every pregnant cow will be cared thoroughly. Total 48 cows administrated by PGF_{2α} for synchronization and after 48 hours 45 cows (93.8%) showing estrus were detected and then artificial inseminate them within who 8 cows (27.8%) showed return estrus. Therefore, Using PGF_{2α} for synchronization is effective to use for Mongolia breeding conditions.

There are possibility of base for food production after all, including increase of livestock production in Mongolia by improvement of breeding cow with AI and embryo transfer project.

(Key words : Mongolia, cow, artificial insemination, dairy industry)

INTRODUCTION

Recently, prices of grain are soaring because of abnormal weather and activation of biomass, and the possibility to extending over a long period of this status quo is beginning to make its appearance. Mongolia including Brazil, the Maritime [Littoral] Province of Siberia, Myanmar, Cambodia are important promoting point with cold plants such as wheat, potatoes, hay.

By promoting livestock, producing food base can be made in the Mongolia. In addition, KOICA (Korea International Cooperation Agency) money would invest for the first time among sites proposed (<http://www.koica.go.kr>).

Mongolia has 80% livestock of total agriculture industry, 170,000 farms are engaged, 2,500,000 of cows are raised. Despite of most of them are traditional pasturage, settled breeding are getting bigger. Especially, tendency to settled breeding with

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dairy cattle is increasing nearby Ulan Bator, the capital city. It's easy to produce feed plants with appropriate environment, and getting high quality feeds. Recently, government is going ahead with a plan of 'Farm Village Master Plan', and has profitable position to get good quality hay with planning suitable feed plants production (www.mofa.gov.mn).

Despite of Mongolian has great application with milk, there are not clear differences between cow and dairy cattle, and the production of milk is also low. But the milk suppliers are varied (horse, sheep, goat, etc), so that the total milk production is 500 thousand ton per year. It's really considerable to improve the breed of owing to many problems with big differences among milk quality.

Not only base of food production, but also milk production import and export would be diversified through improvement of Mongolia milk cows as a solution.

MATERIALS AND METHODS

1. Project Summary

This project is decided to support the region nearby Ulan Bator and Halheugol by Department of Livestock, Gyeongsang National University by financial support from Ministry of for Food, Agriculture, Forestry and Fisheries in S. Korea, and Mongolian State University of Agriculture, including 5 years total terms (April 1st 2009~March 31th 2014) and April 1st 2009~December 31th 2009 term for this year.

2. Purpose and Details

1) Purpose

The purpose of this project is to support and promote Mongolia's national agricultural production which accounts for 80% of the proportion supporting the development of the livestock industry to increase farm income by providing ways, and to improve milk processing quality for domestic and overseas markets with China using semen and cow embryos which promote the improvement of dairy cows. Future, with the Siberian railway to explore the European market, it has purpose to make conditions as production base for Korea milk productive company.

2) Details

This project includes utilizing a domestic third grade dairy cow semen artificial insemination project, utilizing surplus embryos cow embryo transplantation plan, development of artificial

insemination technology for Mongolia environment, excellent equipment artificial insemination and embryo transplant donation, embryo transplantation suitability of a local consulting, Mongolia's livestock specialist training artificial insemination and embryo transplantation technology and products to pass, providing opportunity to apply to domestic university for students of Mongolian livestock applicants.

3. Project Schedule and Plan

1) Schedule

This project is intended to promote from April to May in 2009 for conclusion MOU, basics research, AI dairy farmer research, from June to September in 2009 for local compliant artificial insemination technology, artificial insemination equipment supply and implementation, and technological education, from October to December in 2009 for post management and re-artificial insemination about returned cow.

2) Promotion Plan of Project

(1) MOU Conclusion and Prior Consultation

To perform this project, project institution (Gyeongsang National University of Agriculture and Life Sciences Department of Livestock, Mongolian National Agricultural University, Department of Livestock) signed a MOU (2009 April~May) and consulted with professor D. Altangerel of National Agricultural University of Mongolia (Mongolian National University Dean of Agriculture), select dairy ranch to artificial inseminate to 100 cows nearby Ulan Bator, and negotiate with farmers about information related to this project. In addition, by analyzing the characteristics of Mongolian domestic cow's milk compared with cow weight, milk production and the breeding season to determine the most appropriate to the selection of sperm.



Fig. 1. MOU conclusion with professor T. Baldan and professor Il-Keun Kong.

Table 1. Capacity comparison between Korean and Mongolian dairy cattle

	Korea holstein	Mongolia holstein
No. of breeding cattle	450,000	2,500,000
Milk productivity per one cow	8,500 kg	1,300 kg
Milk consumption per one person	35 kg	134 kg

(Based on 2005, <http://www.maf.go.kr>).

(2) Initiation and Testing of Artificial Insemination Technique
Mongolia's natural environment, most of the cattle in the



Fig. 2. Visit on July, 2009 for Initiation and performance of artificial insemination.

Table 2. Summarized table of capacity of Korean dairy seed bull

Code	Name	PTAM (kg)	PTAF (kg)	PTAP (kg)	PTAT	UDC	Price (Won)	ADVANTAGE
H-1007	BETAVIA	674	12.2	15.2	-0.46	0.71	4,000	PTAM, PTAF, PTAP
H-993	TAZ	-18	2.76	1.7	2.85	2.04	3,000	PTAT, UDC
H-994	NATHAN	167	-4.7	4.1	-0.35	1.04	2,000	Median Umbilical Ligament
HK-158	SUNDO	359	1.92	7.05	0.49	1.22	2,000	PTAM
HK-124	DAECHU	-102	-6.5	-5.1	-1.00	0.49	2,000	UDC
HK-144	SABOMI	141	9.4	5.5	0.55	1.46	2,000	PTAF, UDC
H-979	DOUGLAS	242	-0.4	7.9	-0.06	0.80	2,000	PTAM, PTAP
H-988	ZASPEN	256	9.6	9.5	0.20	1.39	2,000	PTAF, PTAP
H-991	LEEMAN	297	10	7.75	1.99	0.64	3,000	PTAM, PTAF, PTAT
H-977	ZANTZ	88	3.3	3.7	-0.73	0.18	2,000	PTAM
H-1009	FORBDN	8	5.3	2.4	1.56	2.47	3,000	UDC, PTAT

(2009. National Agricultural Cooperative Federation, <http://rd.dcic.co.kr/index.jsp>).

July~August is the natural expression of the estrus. However, in order to inseminate all, the synchronization will be used in the short term. To do this, all the objects we're going to try the $PGF_2\alpha$ injection for luteal phase, if it wouldn't work, try again after 11days. In order to initiate the technology artificial insemination, field training will be carried out with sperm injection in the uterus or cervix by rectum-vagina method which is common worldwide, the most effective artificial insemination technique.

(3) Pregnancy Test and Re-artificial Insemination for Returned Cow

Second AI is carried out about approximately 21 days after AI. After 2 months, all cows not showing returned should be taken pregnancy test. Every pregnant cow should be cared thoroughly.

(4) Delivery Control and Recording Management for Progeny

Production of F1 progeny using AI with Holstein semen will be high on difficult delivery. The reason of this is that Holstein weigh is too big, so that delivery induction should be needed with veterinarian control. Recording about produced progeny, weigh of male and female, pregnancy period, difficult delivery should be thoroughly, check growth rate and foster the people helping Mongolia dairy industry.

Results

Total 48 cows administrated by $PGF_2\alpha$ for synchronization

Table 3. Synchronization and AI of Mongolia cow

Treatments	No. and (%) of cows
No. of synchronization cows with PGF ₂ α	48
No. of estrus cow and AI	45 (93.8)
No. of un-estrus and pregnant	3 (6.2)
No. of non-return cows after AI	37 (82.2)
No. of return cows after AI	8 (17.8)

and after 48 hours 45 cows (93.8%) showing estrus were detected and then artificial inseminate them within who 8 cows (17.8%) showed returned. Therefore, Using PGF₂ α for synchronization is effective to use for Mongolia breeding conditions.

Produced by artificial insemination, progeny can be expected only approximately half of them are heifer. Therefore, AI will be carried out after XX and XY separation next year. In addition, mass production is planned for farmer's desire through maximizing production of heifer birth rates.

The students of MSUA and farmers have wishes to learn the skill through short period program. Therefore, the program will be included next year project. Actually, 2 under graduate and MS graduate student were already administrated in Gyeong-sang National University this year by this program and so I expect that some more students could be continued study in this program.

Mongolia has difficult conditions to synchronize using PGF₂ α

by detecting pregnant mated by natural as most of farmers breed male and female together. To solve this problem, project is carried out by selecting the farm breeding only heifers, and it can be maximized the production rates by synchronization and AI after pregnancy test in late of October. All of cows are detect the pregnancy by rectal palpation and then non pregnant cow will be synchronized by PGF₂ α to induce artificial insemination, even all of cow and bull are cared together in same farm.

It is very difficult to transport the frozen semen from S. Korea to Mongolia, because the direct freight could not available at that time. We have to use the passenger plane to export the frozen semen to Mongolia, but they do not want to ship the LN₂ tank. And so all of frozen semen were keeping in dry ice (-79°C) for shipping period approximately 24 hours and then moved them into LN₂ tank when they were arrived in Mongolia.

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