The Philippine Carabao Upgrading Program (Artificial Insemination Technology) on Mindanao

Simbanatao S. Batugan
Felomino V. Mamuad

Abstract

This study was conducted to determine and evaluate the factors affecting acceptability of artificial insemination on Mindanao. A total of 428 farmers and 28 Philippine Carabao Center (PCC) technicians served as the respondents. Data were collected and gathered with the use of questionnaires and interview schedules. Descriptive statistics were used in analyzing the farmers' and staff's profiles and characteristics. Pearson's correlation analysis was used to determine the relationship of independent and dependent variables.

Results revealed that majority of the farmer-respondents were male and married. Majority finished elementary (41.59%) and secondary education (35.75%), the average family size is 5 persons and owned one carabao per household. They claimed that they were benefited by the PCC upgrading program and therefore the program was acceptable to them. The farmers had appropriate knowledge in animal reproduction, feeding management and environmental factors affecting the animals.

The average age of PCC technicians was 38.22 year; majority was male, married and BS degree holder. They had been in the government service for 10-20 years with a salary range of P50,000 – 100.000 per annum. They were knowledgeable about artificial insemination technology, like sperm collection, motility identity, semen preservation and techniques in insemination. The personnel attitudes generally agreed on the different statements as valid.

A significant relationship was obtained between farmer's age and educational attainment and acceptability of artificial insemination but negative to other farmer's characteristics. The personnel's characteristics in AI related training is positively related with the acceptability rate but other personnel characteristics were not correlated with the acceptability of AI. A significant relationship was observed between awareness of AI program and the level of acceptability of AI but not related with mass media.

Analysis showed a very high relationship between staff knowledge and AI acceptability; however, restraining, record and synchronization were not related to the acceptability rate. No relationship was observed between farmers' technical knowledge and the acceptability rate of AI but factors as animal reproduction and heat period had a positive relationship with acceptability of artificial insemination.

Statistical test revealed that environmental factors were significantly related to acceptability of AI, particularly the temperature. Animal illness, pest and diseases, and practices such as colostrum

feeding, feeding concentrates and milking dam are not related to the acceptability of AI.

Introduction

The establishment of the Philippine Carabao Center (PCC) as mandated by law (RA 7307) gave incentive to the carabao upgrading program throughout the country. In the Mindanao region the program is focused more on intensive Artificial Insemination using hormone to synchronize heat induction so that more caracows and caraheifers could be inseminated at a time. This program resulted in the increased calf crop in the rural areas as the smallhold farmers hold 99.7% of caracows. These farmers normally used their own carabaos for draught purpose, therefore natural breeding of the female had probably been avoided, a sound explanation for the low calf crop (12%) before the PCC program began. High extraction rate (that was never documented although carabeef is sold in metropolis and passed as beef) caused the carabao population to drastically go down from approximately 2 million in 1986 to 1.8 million in 1988. Operationalization of PCC, however, raised the population to 2.8 million in 1996 with an average growth rate of 2.42 per year.

The PCC comprises a network of 13 centers to undertake carabao AI. There are 5 in Luzon, 4 in the Visayas and 4 in the Mindanao Region. Each center in the Mindanao region has a specific area of jurisdiction; however, overlap of AI operations normally happens due to closeness of the area from the center and also due to requests from the local clientele.

After five years of operation the program is being assessed for the Mindanao area to determine the factors relatively associated with AI and its acceptability in the rural areas.

The assessment is premised on the following grounds: that there is no significant relationship between socio-demographic factors, PCC staff communication related factors, technical and environmental

factors to the acceptability of the AI program.

Methodology

Pre-tested summary questionnaire and direct interviews were undertaken throughout Mindanao. Secondary data relative to the assessment were taken from records of PCC in Mindanao municipal and barangay offices.

There were 428 household (farmers) surveyed/interviewed as sampled in Region 9, 12, 10 and ARMM. The respondents likewise were farmers from both the Christian and Muslim areas. On the PCC centers every technical personnel of the four centers of PCC (USM, CMU, MSU and MLPC) were solicited as respondents.

Results and Discussion

Mindanao Farmers Profile

Most farmers on Mindanao are male (90.42%) indicating that farming is generally men's activity. Women's participation in this venture is related to economic activities like feeding raised chickens and tethering the carabao or goat for the farmer (husband) who rests from work (Derico, 1984 & Castillo, 1971). Women also influence their better-half in decision-making in farm operations (Ahmed 1995), a sound attitude that Pilipino couples normally undertake.

Most farmers are married (86%) and are mentally and physically mature enough to face farming activities (47 years. old). Their experience in farming with the carabao used as draft animal ranged from 16 to 44 years with a mean 30.65 years (Table 1). Such experience could imply that they can raise and manage their carabaos in any given condition, including difficult situations.

Most farmers have had schooling with 41.6% reaching elementary and 35.7% secondary. Very few have tertiary (7.71%) and at least a baccalaureate degree (7%). The family size ranged from 1

to 16 and 5 members is most common in a given household (Table 1).

Literacy plays a vital role in making decision particularly in the adoption of new technologies through any means of communication system (Table 1). For instance 66% of respondents read printed materials with 35% reading general news circulation, 31% read comics and only 9% read scientific items; 87% listened to radio, 55% listened to agricultural programs, 45% listened to drama and 30% to current development. On TV shows 36% watched programs related to agriculture, followed by 31% movies and 20% sports. Sison (1973) disclosed that individual contact appropriate for action change while mass media fit the interest and awareness stage, contradicting the earlier finding of Trodahl and Van Dam (1966).

These farmers have income ranging from 5,000 to 100,000 pesos and the average is 31,736 pesos which is in the average poverty line (Table 1).

Table 1. Profile of Mindanao Farmers and Communication Factor

Characteristics	Frequency (n = 428)	Percentage
Sex		
Male	387	90.42
Female	41	9.58
Age		
Mean and below	216	50.47
Above mean	212	49.53
Marital Status		
Single	35	8.18
Married	369	86.21
Widow	22	5.14
Separated	2	0.47

Educational Attainment

Primary	178	41.59
Secondary	153	35.75
Certificate	33	7.71
BS degree	29	6.78
MS/Ph.D.	1	0.23

Family Size

Mean an below	241	56.31
Above mean	187	43.69

Family Income/Annum

Mean and below	170	39.72
Above mean	128	29.91
No response	130	30.37

Mass media exposure
Paper read

Scientific items	38	8.88
News	142	33.18
Comics	129	30.14

Radio programs

Radio programs	**381**	**89.02**
Agri program	239	55.84
Drama	192	44.86
Current events	130	30.37

TV shows

TV shows	**286**	**66.82**
Agri program	155	36.21
Movie	133	31.07
Sports	86	20.09

Profile of PCC Personnel

PCC personnel at four state strategic centers (technicians) are mostly males (92%) having an average age of 38 years, 88% married, mostly baccalaureate degree holders and have been in the government service for at least five years (61%) as shown in Table 2. Their main

salary range is from 50,000-100,000 pesos and they have undertaken training in AI (84%). The profile implied that these technicians are mature enough and energetic in performing their task, they being knowledgeable (have passed training course and experienced in-service) in their field of endeavor, confirming the findings of Liano (1973) and Dilla (1979) who reported that workers who stayed longer at their job develop skills and positive attitude towards it, compared to novices and less experienced personnel.

Table 2.   Socio-demographic Profile of the Staff/Personnel

Characteristics	Frequency (n = 26)	Percentage
Age		
Mean and below	12	46.15
Above the mean	14	53.85
Sex		
Male	24	92.31
Female	2	7.69
Marital Status		
Single	3	11.54
Married	23	88.46
Educational Attainment		
Primary/Secondary	-	-
Certificate	1	3.85
Diploma	1	3.85
BS	19	73.08
MS	5	19.23
Length of service		
20 years up	5	19.23
10 – 19	8	30.77
5 – 10	8	30.77
1 – 4	5	19.23

Salary/annum

200,000 and above	-	-
100,000 – 200,000	7	26.92
50,000 – 100,000	13	50.00
Less than 50,000	5	19.23
Others	1	3.85

AI related trainings

AI training course	22	84.62
Semen processing	2	7.69
Others	2	7.69

AI Acceptability Rate

Throughout Mindanao the farmers rating of AI acceptance is shown in Table 3. Of the 428 respondents, 35% rated the program excellent, other rated it good (11%) and fair (28%), indicating general acceptance of the program. Such positive acceptance can be traced to the literacy rate, in which our farmers have mostly (71%) gone to school, as indicated previously. A high educational background made the farmers more sensitive to issues relative to their farming venture. Being literate, the farmers can easily understand and enrich their technical capability to weigh the pros and cons of AI especially when seminars-workshops are provided them by PCC technicians in the course of the carabao upgrading program, corroborating the report of Chua (87) that training and seminars enrich the farmers knowledge and skills in acquiring new information, broadening their capability in the best use of the new technology and freeing them from the shackle of ignorance. This can be noticed from the high participation rate on AI. Training and fora (Table 3)

Table 3.   Acceptability Rate of PCC Upgrading Program

Item	Frequency (n = 428)	Percentage
Acceptability rate of AI program		
Excellent	148	34.58
Good	48	11.21
Fair 118	27.57	
Poor	10	2.34

Technical Capabilities of Farmers

Generally, Mindanao farmers are learned in the feeding management of their carabao, as shown in Table 4. However, most of them (35%) follow the traditional way of feeding management, that is, tethering and grazing their work carabao without concentrate supplementation. Farmers claim that their carabaos being utilized for draught purposes and the presence of abundant forages on Mindanao do not need concentrates, thus the only supplementation generally provided is salt (68%). This claim is understandable as farmers income could just be sufficient to meet their basic needs. It conforms to the previous finding that the main source of feed for carabaos are forages, either cut or grazed (Batugan et al 1992).

On breeding knowledge, majority of respondent (69%) claim they are knowledgeable and have observed their carabaos in heat together with other signs (77%). They also claim that they can recognized pregnant cows (87%) and the related inherent signs of pregnancy. What was not very clear was knowledge about the length of carabao gestation period. In fact many (40%) claim that their caracow reproduced yearly. Based on the length of the gestation period of 317 to 335 days under Philippine condition, such observation could not be true. This gestation length was confirmed by findings in carabao-producing countries like Thailand (Chantalakhara 1981) and India (Johari 1960).

Table 4. Technical knowledge of farmers on feeding management and animal reproduction

Items	Frequency	Percentage
Have knowledge about feed management		
Yes	276	64.49
No	126	29.44
Adopt any feeding practices		
Yes	304	71.03
No	90	21.03
Feed practices used often		
Basic principle of nutrition	48	11.21
Formulate balanced ration	96	22.43
Traditional feeding practices	150	35.05
Supplementation		
Yes	307	71.73
No	84	19.63
Kind of supplement		
Salt	293	68.46
Commercial mineral mix	55	12.85
Knowledge on animal reproduction		
Yes	295	68.92
No	84	19.63
Knowledge on age of puberty		
Yes	302	70.56
No	88	20.56
Have observed animal in heat?		
Yes	331	77.34
No	48	11.45
Signs of heat exhibited		
Mounting other cows	200	46.73
Swollen vulva	167	39.02
Stand still when mounted	150	35.05
Copious discharge	142	33.18
Very restless	127	29.67
Recognize pregnant cow		
Yes	372	86.92
No	14	3.27
Signs of pregnancy		
Enlarged abdomen	268	62.62
Cessation estrus	183	42.76

Technician Capabilities in Breeding and Reproduction

PCC technicians being baccalaureate holders and having had training in AI as discussed earlier, have adequate knowledge in the carabao upgrading program (84.62%) as well as on feeding and management. Technician-respondents claimed that such technical knowledge was acquired during training of AI and further enhanced through the years by direct AI activities. Except for semen collection, which was provided in passing at the training course, palpation via rectum of caracow for possible pregnancy and insertion of the AI gun became a common practice of skill. In instances, however, in which the female reproductive tract is malformed 35%, confessed they still found difficulty in the actual AI operation. When asked about the best time to inseminate naturally recurring in heat or synchronized caracows, the unanimous answers were middle and late estrus time. These answers were in agreement with research finding that high incidence of fertilization takes place when AI is conducted towards end of heat, as caracows, like cattle, ovulate 14 to 29 hours after the end of estrus. (Bashirov 1976 and Hunter 1982) (Table 5)

On the PCC technician side, caracow insemination process, semen collection, semen evaluation, motility, thawing and semen preservation provided the highest correlation of acceptability. Facilities used and the use of the artificial vagina are likewise significantly related to acceptability, while caracow restraint at AI, animal record and synchronization has no significant effect (Table 6).

All technical knowledge known to farmers except animal reproduction, heat period and cow nearing parturition had significant effect on AI acceptability (0.98, 0.121 and 0.107 (Table 6). This implied that, in the upgrading program of carabao farmers, the reproductive processes were more important than the feeding management, feeds and feeding supplementation. This further implied that the farmers applies sufficient knowledge in nutrition to the care and management of their caracows so that they could provide better draftability. Thus at the time of AI these cara stocks were in good body condition for receptivity of the program.

On the effect of environment, temperature showed a positive correlation to acceptability.

Table 5. PCC Personnel's Knowledge and Skill on Artificial Insemination Technique.

Items	Frequency (n = 26)	Percentage
Knowledge in inseminating cow?		
Yes	22	84.62
No	4	15.38
How was knowledge acquired?		
Training	22	84.62
Experience	4	15.38
Formal education	-	-
Knowledge in semen collection?		
Yes	9	34.62
No	17	65.38
Problems encountered		
Difficult to locate cervix	3	11.54
Abnormal reproductive tract	9	34.62
Wild cow	7	26.92

Best time to inseminate (Ranking)	Main Rank	Rank	Overall Rank
Early heat	2.35	Poor	3
Middle	3.1	Good	1
Late heat	2.85	Good	2

Table 6. Relationship between Technician's and Farmers knowledge and the level of acceptability of artificial insemination

A – Staff's knowledge	Pearson's Correlation Coefficient
Artificial Insemination	
Inseminating cows	0.360**
Semen collection	0.213**
Equipment/facilities	0.108*
Use of Artificial Vagina (AV)	0.112*
Restraining animal during insemination	0.086^{ns}
Check animal record before insemination	0.073^{ns}
Cow synchronization	0.093^{ns}
Semen Evaluation	
Semen evaluation	0.223**
Motility	0.195**
Method of thawing	0.170**
Semen Preservation	
Preservation of semen	0.326**

B – Farmers' knowledge Factors	Pearson's Correlation Coefficient
Animal reproduction	
Animal reproduction	0.098*
Age of puberty	0.036^{ns}
Heat period	0.121*
Pregnant cow	0.085^{ns}
Cow near parturation	0.107*
Cystic ovary	0.077^{ns}
Cryotorchidism	0.009^{ns}
Freemartin heifer	0.053^{ns}
Environmental factors	0.126*
Temperature	0.113*

** Highly significant ($p \leq 0.01$)
 * Significant
ns not significant ($p > 0.05$)

Conclusion

Based on the findings of this study, the following conclusions were drawn:

1. The significant relationship of age and educational attainment with level of acceptability of AI accepted the hypothesis on these variables. This means that age and educational attainment influence the acceptability rate of AI among Mindanao farmers.

2. On PCC technicians, AI related training of the technicians gives them higher credibility to conduct AI; consequently, farmers' awareness of the AI program implies that participation through training facilitates technology adoption.

3. The significant correlation of some of the technical factors and acceptability of AI on the part of the farmers and the technicians show that knowledge experienced by the farmers through training and in practice has facilitated their acquired and developed know-how and have enhanced their credibility as source of AI information and technology that consequently made AI acceptable to the farmers.

4. The farmers' knowledge on environmental factors, especially temperature, which was significantly related to acceptability rate of AI, suggests that they have utilized this knowledge for AI adoption.

Recommendations

Based on the results, these are the recommendations:

1. Manpower

   It is recommended that additional technicians be trained, fielded and stationed in municipalities, with the sole responsibility of assisting farmers in upgrading their native

stock. Local Government Units can localize the technology and the AI Program. Honest and trusted PCC technicians on sight will ensure the credibility of the PCC as an agent in the carabao-upgrading program. The lukewarm attitude of the farmers toward the upgrading program can be eliminated if skills on reproduction are taught to them.

2. Transportation and Communication

The different centers should be provided vehicles to monitor all the activities of the technicians in the field. Communication facilities should also be improved. The national government should look into the construction of barrio roads for easy access of the technicians in performing their job.

3. Supplies and Materials

Semen and liquid nitrogen are the important ingredients in the upgrading program. Availability of these materials/supplies is a must. A PCC semen-processing center on Mindanao should be established. The site for consideration should be adjacent to the four centers so that shortage of these supplies will be eliminated.

4. Peace and Order

The root cause of the troubled peace and order is poverty. Intensifying agricultural development by providing more incentives to farmers through technical support will minimize if not eliminate insurgency problems. A vigorous extension program on the different technological factors like feeding, mineral supplementation, disease and pest control should be implemented to help farmers increase their production.

5. Policies and Program

The government should institute strong policies for the provisions of the strengthening the carabao slaughtering. A stiff penalty for people who do not follow the policy should

be enforced. Increase the number of satellite centers, if possible, in every province, in order to fast-tract the delivery systems to the clienteles. This would assure every farmer with immediate PCC services.

6. Future Conduct of Studies

Follow-up studies on the impact of the PCC Upgrading program should be encouraged especially with regard to the different aspect of the PCC programs.

LITERATURE CITED

1. ACOBA, T.T. 1990. Role performance of Central Luzon State University-Philippine Carabao research and Development Center trainees on Artificial Insemination and Pregnancy Diagnosis of Water Buffaloes. Ph.D. Dissertation. Muñoz, Nueva Ecija.

2. AHMED, D. 1995. Adoption of modern technologies in a rice-wheat system. A case study of two villages of Northwest Bangladish. Unpublished dissertation, CLSU, N.E.

3. ARTIFICIAL INSEMINATION IN LARGE RUMINANTS 1993. A handbook manual for students workers and technicians in the Artificial Insemination field, National breeding Center, 1ˢᵗ edition. Philippines.

4. AROCENA, V.V. 1995. Communication analysis of the Philippine Carabao Center (PCC). Ph.D. dissertation. UP at Los Baños, Laguna.

5. CRUZ, L.C., P.G. DURAN, F. AQUINO, T. MATSUMOTO, E. MACALANDAG, F.V. MAMUAD, AND R.O. CUARESMA, 1990. Frozen buffalo semen handling and thawing practices of AI technicians and their effects on semen quality. Phil. J. Vet. Anim. Sci. 16-76.

6. HAFEZ, E.S.E. 1987. Reproduction in farm Animal. 5ᵗʰ edition. Lea and Fenberger, USA.

7. JAINUDDIN, M. R. 1985. Recent development in breeding and management of water buffalo. Proceeding of the 3ʳᵈ AAAP Animal Science Congress "Efficient Animal Production For Asian Welfare" Seoul, Korea pp 62-69.

8. MAMUAD, F.V., P.G. DURAN, AND H.V. VENTURINA. 1984. Estrus phenomena of carabao under range management condition. Phil. J. Vet. Anim. Sci. 10 (3-4):46 (Abstr.)

9. SISON, O.F. 1973. Reaching and influencing farm families through agricultural extension in Chiwen Chang. A strategy for agricultural and rural development in Asian countries. Vol. SEARCA, College, Laguna, Philippines. Pp 359-360.

10. _____, 1996, Annual Report. Philippine Carabao Center, Department of Agriculture, Manila, Philippines.