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## **Institutional and organizational issues in livestock services delivery in Bangladesh**

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### **Abstract**

The objective of this paper is to explore the issue of artificial insemination (AI) services delivery in relation to livestock development by reviewing the case of institutional and organizational arrangement in Bangladesh. It is argued that globalization and adaptation of open market economy policy has opened the significant opportunities for livestock keepers. The demand for livestock would increase almost two folds due to increase in population, rapid urbanization, and rise in income and would continue to rise till 2020. This increase in demand will create a potential market opportunities. The ability of the farmers to exploit those opportunities is linked critically to the availability and access to quality AI services. This paper is an attempt to provide the background information of AI starting from historical context to the existing institutional arrangement and synthesis of institutional framework for providing the AI services effectively and efficiently in Bangladesh.

**Keywords:** AI services delivery, institutions, livestock, organization

**JEL:** Q 160, Q 180

### **1. Introduction**

Nearly one billion of livestock are kept by more than 600 million small farmers in rural areas around the world. Much of these livestock keepers – about 95% – live in extreme poverty. Smallholder, resource poor livestock producers are dominating in Bangladesh. As a result of globalization and adaptation of open market economy policy, significant opportunities are opening up for most of developing countries. Due to population growth, rapid urbanization and rise in absolute income, the demand for

livestock and livestock products will continue and it will be double in the year 2020 in most of the developing countries (Delgado et al., 1999). According to BANGLADESH ECONOMIC REVIEW (2006) the growth rate in GDP in 2004-05 for livestock was the highest of any sub-sector at 7.23%, compared to 0.15% for crops, and 3.65% for fisheries sub-sector. This increase in demand has created an enormous market opportunity that can be exploited by the smallholder livestock owner. In order to take advantage of emerging market demands and reduce their poverty, smallholders need access to basic services and technologies and institutional arrangement (e.g. market).

The productivity of animals depends crucially on the quality of nutrition, genetic material and health status, and these substandard in Bangladesh. Overcoming such problems entail a rapid increase in the demand for good quality livestock support service but the existing institutions and related policies are not geared up to face that challenge. No institutional mechanisms have yet been developed to identify constraints to livestock production, the services need to poor livestock keepers and the ways and means to deliver that at minimum cost (AHUJA and REDMOND, 2001). The policy priorities and directions for service delivery often get determined by the biases and beliefs of the decision maker. While those trained in veterinary science argue that it is poor animal health which is the main constraint to livestock production, the nutritionist point to the poor availability of feeds and fodder, the breeders to poor genetics (AHUJA and REDMOND, 2001). A whole range of services including veterinary health, production advisory, credit, market information, and market access needs to be operational for quality services and inputs.

Artificial insemination service has been considered a significant vehicle to upgrade the existing reproductive performance of cattle breeds by implementing the cross-breeding program in order to increase the cattle production. Although the history of research into artificial insemination (AI) is over two centuries old and its commercial application has now already span 75 years, in Bangladesh, artificial insemination (AI) has first been introduced only in 1959 (SHAMSUDDIN et al., 1987; ALAM and GHOSH, 1988) and its commercialization started and gained reputation in 1975 (ALI, 2003). Since then several research efforts have been focusing on the biological aspect of how AI can increase the productive potential but studies on the efficiency of AI service delivery are missing. Thus, the attempt of this paper will be a pioneer for all the potential users of constitutional, collective and operation level especially those who are involved in policy making and strategic planning of providing AI services. Therefore, the major objective of this paper is to review the context of AI services delivery and synthesis of institutional and organizational issues related to efficient delivery of AI services in Bangladesh.

## 2. Research framework and approach

This study has reviewed the potential of existing cattle genetic resources, adoption of AI in the livestock sector, attempts already taken to improve the cattle genetic resources and the institutions and organization in relation to AI service delivery. The approach uses the concept of the Institutional Analysis and Development Model (IAD) (OSTROM et al., 1994), which combines elements from episode studies of institutional and organizational changes tracking back from institutional changes to identify key actors, events and influences; and assessing their relative importance and outcome mapping approach-identifying changes in behaviour of the key actors and analysing what influenced these changes.

Material was collected through: i) an intensive literature review of livestock sector with special emphasis on AI service delivery ii) individual interviews both formal and informal with different stakeholders such as farmers, AI service providers (personnel involved in AI centre and Ministry of Fisheries and Livestock) to triangulate and clarify the facts revealed from literature. This information was then assembled to provide an explorative and narrative summary with ultimate objective of establishing the background information of delivery of AI services to the livestock keeper that would be useful for future research and extension of livestock support services to the farmers.

## 3. Results and discussion

### 3.1 Cattle genetic resources and their performance in Bangladesh

All of the cattle in Bangladesh are *Bos indicus* (DLS, 2005). Bangladesh has one of the highest cattle densities: 145 large ruminants/km<sup>2</sup> compared with 90 for India, 30 for Ethiopia, and 20 for Brazil (KARIM, 1997). But the majority of the cattle are belonging to the marginal and smallholder farmers which can be depicted in table 1.

**Table 1. Cattle ownership category**

Type of household	Number (in million) of		% of	
	Cattle	Buffalo	Cattle	Buffalo
Landless (<0.05 acre)	2.21	0.08	9.45	9.81
Small (<0.05-2.49 acre)	12.63	0.24	53.97	29.37
Medium (<2.5-7.5 acre)	6.88	0.29	29.40	34.94
Large (>7.5 acre)	1.68	0.21	7.18	25.88
Total	23.40	0.82	100	100

Source: DLS (2003); MOHIUDDIN (2003)

The study done by SIDDIQUI (2004) identified three main varieties of cattle that exist in Bangladesh. These are:

- Large Deshi (indigenous), represented by the North Bengal Gray; the Dhaka type and the Faridpur type;
- Small Deshi, which are found everywhere except in the Chittagong and Hill Tracts;
- Red Chittagong which are mainly found in Chittagong and Hill Tract (southern districts of Bangladesh).

The reproductive performance of the cattle types are compared in table 2.

**Table 2. Reproductive characteristics of indigenous (both large deshi (LD), small deshi (SD)) and red chittagong cattle (RCC)**

Reproductive characteristics	Indigenous (LD and SD)	RCC
Age at sexual maturity (years)	3.0	2.75
Age at puberty (years)	2-2.5	2.0
Age at first calving (years)	3.5-4	3.8

Source: SIDDIQUI (2004); SALMA et al. (2002)

In addition, there is also a cattle genetic resource which is called Pabna milking type cattle, small population of introduced or developed breeds some of which are based on Haryana cattle imported from India and Sahiwal from Pakistan which were distributed among farmers of Pabna district with abundant fodder production. Through many generations of up-grading of local cows (Local\*Haryana or Shahiwal), the local cows have become a notably dairy type forming the Pabna cattle.

### **3.2 Institutional changes of cattle breeding in Bangladesh: historical context**

Before 1930s, there was no organized breeding known in the country; random mating took place in a random manner between village cows and bulls. In consequence, the majority of the cattle population (approximately 90%) developed into ecotypes adapted to the prevailing conditions without specific performance characteristics (SIDDIQUI, 2004).

The then viceroy, Lord Linlithrow, had realized the potentiality of cattle population and hence took initiatives to improve the cattle breeding. A new era of cattle breeding was started after the initiatives taken by the English colonial administrator. To increase

the productive and reproductive performance of the cattle, 1,000 Haryana cattle were imported from Northern India in 1933 and distributed for breeding purpose among farmers in Pabana, Sirajgonj, Madaripur, Gopalganj, Rajbari, Sariatpur, Manikgonj, Munshigonj, Kishorgonj and Dhaka Districts (DLS, 2005). During the same time, two dairy farms were established to provide Haryana bulls for up-grading, one in Sylhet (400 km north-east from Dhaka) and the second one in Dhaka Tejgoan. The up-grading process with the Haryana bulls increased the production of milk, body size and physical energy for draught power.

The institutional arrangement for cattle breeding was such that the farmers will maintain the bull in the 'village bull station' as well as have to pay a nominal amount per month as so called "maintenance allowance" whereas the government was responsible for castration of the local bull and distribution of seeds and seedlings of leguminous fodder kheshari (lentil), cow pea (*Vigna unguiculata*), matikali (*Vigna sinensis*)) at a subsidized rate to the farmers (SIDDIQUI, 2004). The distribution programme of Haryana bulls continued until 1947 and the Sylhet and Dhaka dairy farms converted to Breeding Farms (DLS, 2001). However, after a pause of some several years, the bull distribution programme was resumed with the importation of Sindhi and Sahiwal from Pakistan into the breeding farms for multiplication and distribution for the 'village bull centre'. Based on this upgrading practices with Haryana, Sahiwal and Red Shnidi, larger parts of the current cattle population resembles a combination of local and introduced genes. Up to now all the breeding activity was based on natural services. There was no record keeping and no registration of the breeding animals in that time. Artificial insemination service was introduced for the first time in 1959 by establishing 5 District Artificial Insemination Centre (DAIC) in Dhaka, Chittagong, Rangpur, Rajshahi, and Jessor. The principal objectives of the then AI program were (DLS, 2005):

- Full exploitation of high yielding bull
- To prevent the sexual diseases and to control free mating
- To improve the local and indigenous cattle

The DAIC were engaged to produce the liquid semen in order to inseminate the local cows but the demand was exceeded the supply. Therefore, to produce more semen, in 1959-60, Central Cattle Breeding Station (CCBS) and Dairy Farm was established in Savar to produce more improved bulls. As a continuation of the improvement of the cattle breeding through AI services, there was an extension of AI activity and more AI centres were established in Takugaon, Pabna, Kusthia, Faridpur, Barisal, Comilla, Noakhali, Sylhet and Mymensingh. At present (as in April, 2006), there are 23 DAIC (including CCBS) along with 423 sub-centres and 554 AI points in operation (GOSH, 2006). From its establishment, CCBS has been working as a coordinating institute of

all AI centres in Bangladesh. It is charged to conduct applied research in cattle breeding, reproductive biotechnology, feeding and to develop a suitable cattle breed and good varieties of fodder (DLS, 2005). Up-grading of local cattle was undertaken in the farm but systematic worthy breeding work become impossible until 1969 due to lack of adequate related facilities and trained personnel (SIDDIQUI, 2004).

In 1969, a bilateral programme with Federal Germany was undertaken. Infrastructure development, training of personnel, research with cross breeding was the major issues of cattle breeding under this bilateral program (SIDDIQUI, 2004). During 1971 war<sup>1</sup> this programme was interrupted for a while. After the liberation war, this program again has been commenced with the same objectives in 1973. However, the sustainability of these activities was much below than the expectation with hardly any records left.

### **3.3 Artificial insemination service: link with institution, organization and governance**

The artificial insemination centre-as a public infrastructure and the artificial insemination service-as public or quasi-public or private goods entail the understanding of the knowledge of institutions and governance structure for increasing the performance of this service. It is also essential to understand how institutions interact with organization and how governance plays a role in producing efficient outcome. Therefore, this section will explore the major aspects of institutional economics especially the New Institutional Economics (NIE) which would, in turn, be helpful in developing the theoretical framework and model specification in analyzing the AI service from institutional perspectives. NIE studies institutions and how institutions interact with organizational arrangements (MENARD and SHIRLEY, 2005). New institutional economics abandons the standard neoclassical assumptions that individuals have perfect information and unbounded rationality that transaction is costless and instantaneous.

### **3.4 Institutions in relation to AI service in Bangladesh**

According to NORTH (1990), institution can be defined as the written and unwritten rules, norms and constraints that humane devise to reduce the uncertainty and control their environment. These include:

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<sup>1</sup> The war that occurred in 1971 was called “liberation war”. Before 1971, Bangladesh was known as East Pakistan. After doing 9 month fighting against the then West Pakistan, Bangladesh has been incorporated as an independent nation in the world map.

- Written rules and agreements that govern contractual relations and corporate governance,
- Constitutions, laws and rules that govern politics, government, finance, and society more broadly, and
- Unwritten codes of conduct, norms of behaviour, and beliefs.

Organizational arrangements are the different modes of governance that agents implement to support production and exchange. These include:

- Markets, firms and the various combinations of forms that economic actors develop to facilitate transactions and
- Contractual agreements that provide a framework for organizing activities, as well as
- The behavioural traits that underlie the arrangements chosen.

Translating these institutions to the case of AI service in Bangladesh, it seems that institutions are required to guide the process of measures and to create incentives for the stakeholders to participate and cooperate in the delivery of AI service. Ostrom (1992) identified four negative impacts (e.g. free-riding, rent seeking, corruption and opportunistic behaviour) in economic performance when there is lack of institutions. When institutions are weak, inefficiency of AI service is the outcome. If well working institutions exists and if individuals are given right incentives, the users will be motivated to work together and will produce a better outcome. In the light of this discussion, it is evident to point to the importance of institutions for efficient delivery of AI. Institutions provide the basic structure by which government creates order and attempt to coerce to reduce uncertainty in exchange and also the biasness and autocracy in decision making regarding the delivery of AI services.

The failure of the existing institutions entails the necessary for institutional change. Institutional change is a deliberate process shaped by the perceptions of the actors about the consequences of their actions (North, 2005). The immediate vehicle by which the actors attempt to shape their environment is by altering the institutional framework in order to improve their and (their organizations') competitive position. There are five propositions that describe the process of economic change and its economic performance (North, 2005). Applying these into the situation of Bangladesh AI service delivery system, the results are shown below:

- The continuous interaction among different stakeholders, DLS and BRAC (private organization) in the existing socio-economic situation provide the competitive environment which will be treated as the key driver for institutional change in the AI service delivery system in Bangladesh.



- The competitive environment between DLS, cooperative and other private organizations entail the new skills and knowledge to survive for efficient service delivery which provides the framework for institutional change.
- The organizational objective to maximize their efficiency in AI service delivery provides the framework for incentives. The incentives enhances more interaction among stakeholders and efficient AI service delivery is the outcome
- The perception of all stakeholders such as services providers (Central Cattle Breeding Station), service implementers (District Artificial Insemination Centre), and service users (farmers) about the services will guide the future institutional form for providing the AI services.
- The institutional change is mandatory in the case of Bangladesh as because the existing institutions are not in the line of institutional matrix (economies of scope, complementarities, and network externalities).

Therefore, institutional change is a very important determining factor in analysing the economic performance of AI services provided to the farmers because the existing institutions are not focusing on the right incentives to work well and hence, it is essential to rearrange the institutional setting to improve the performance of AI service in Bangladesh (DLS, 2004)

### **3.5 Insemination service in relation to governance and regulation**

Governments are a key element in governance, harmonising and facilitating not only the market economy, hence reducing the transaction costs, but also in defining overall goals for the AI service system. Therefore, the role of government should be viewed at a broader level as coordinator of activities in the AI sector, increasing cross-sector collaboration. The aim being not only to reduce transaction costs, but also, and especially, to guide current initiatives towards a common goal for AI services.

In the case of AI service delivery in Bangladesh, the governance, acts and regulations do not exist. Even if they exist in some cases, they are not functioning well. The existing acts and regulations are (SIDDIQUI, 2004):

- Cattle Trespass Act, 1871
- The Livestock Importation Act, 1898
- Glanders and Farcy Act, 1899
- The Bengal Cruelty to Animals Act, 1920.
- The Bengal Disease of Animals Act, 1944.

- The Animal Slaughter (Restriction) and Meat Control Act, 1957
- The Animal Slaughter (Restriction) and Meat Control (Amendment) Act, 1957 and
- The Veterinary Surgeon's Act 1977.
- Animal Quarantine Act-2005
- Animal Disease Prevention and Control Act-2005

None of the above acts is related to breeding and conservation of genetic resources in the country. Over and above, most of them are obsolete in nature and hardly to impose. There is also problem of bureaucracy in governance and creating act. To prepare an act, it takes long time and many procedure and formalities. The DLS has to prepare the draft proposals of the act under the active consideration of the government. The proposals pass to usual routine examination and evaluation as well as recommendations by the Ministry of Law and Parliamentary Affairs and by the cabinet of the government. Finally it will pass in the “Jatio Sanshod” (National Parliament).

#### **4. Synthesis of institutional framework for delivery of improved AI services to the farmers**

Artificial insemination provides the cow-calf producer an opportunity to use bulls possessing superior genetics. Depending upon the needs and goals of an individual's breeding programme, AI offers an economically feasible means of increasing productivity over a wide range of traits. The performance of AI service is influenced by the establishment of an effective AI management programme (WALKER et al., 1994). The institutions are the core of establishing such an effective AI management programme for delivery of AI services to the farmers. For this, there is a need of institutional framework that enable to identify which institutions will provide what kind of services to whom. The framework will also describe the role of different organization in providing the incentives for efficient delivery of AI service to the farmers. A joint report by IAEA (International Atomic Energy Agency) and FAO (Food and Agricultural Organization (2004) on “Improving Animal Productivity and Reproductive Efficiency” provides the general guidelines and recommendations for improving the artificial breeding of cattle and buffalo in Asia. On the basis of this report, the case study and in combination with several other literatures, this section will explore the institutional framework for the provision of efficient delivery of AI services in Bangladesh.

## 4.1 Analysis of role of institutions and organization

### *4.1.1 Role of public sector*

For improved delivery of the AI services, participation of public sector is mandatory in developing infrastructure, linking different organization, formulating breeding policies and to provide guidelines to AI services and also need to emphasize the farmers' choice of selection of breeds and, if importation of semen is done, on its genetic value. The other area where public participation is also essential is in case of market failure. If market is failed to provide the efficient and equitable AI services, then public intervention is necessary to provide conducive market environment for efficient delivery of AI services and also to monitor and sanction the unfair competition among the AI service providers.

### *Department of Livestock Services (DLS)*

The DLS is working under the Ministry of Fisheries and Livestock (MOFAL) which is an apex organization responsible for all kinds of livestock development initiatives such as livestock production, extension, research, training and evaluation. The activities of the DLS are overseen by a Director General supported by a group of professionals and supporting staff of about 8426 (DLS, 2003). The Central Cattle Breeding Station (CCBS) is under the wing of production. The District Artificial Insemination Centre (DAIC) is under the wing of Extension. The CCBS is responsible for maintaining all the AI activities and acts as a coordinator of all the District Artificial Insemination Centre in Bangladesh. The CCBS provides all the raw materials of AI services to the DAIC for example, frozen semen, liquid nitrogen, inseminating materials, equipment for laboratory analysis of semen and so on. In addition, in collaboration with Bangladesh Livestock Research Institute (BLRI) and Bangladesh Agricultural University (BAU), and other research organizations, the DLS is trying to develop and propagate sustainable technologies to accelerate the developments of livestock.

### *District Artificial Insemination Centre*

The DAIC are the implementing organizations who conduct the AI services to reach the services directly to the cattle farmers. The DAIC is composed of several sub-centres and points. The DAIC acts as a coordinator of all the sub-centres and points that are belong to the respective DAIC. The principal activities include (DAS, 2006)

- Collection of frozen semen from the CCBS and use of that semen to do AI. Generally FA-AI is responsible to do AI.
- Production of liquid semen by rearing the bull in the centre
- Quality analysis of liquid semen in the laboratory
- Arranging training programme for the farmers
- Responsible for distributing the incentives to the farmers those who use AI from them and also maintain the record of AI and their progeny. The DAIC is facing a problem in distributing incentives because the amount of incentive is low as compared to the requirement
- In addition of their own services, the DAIC is responsible for supplying the frozen semen to the different sub-centres and the sub-centres send the semen to the point.

#### *4.1.2 Role of private sector*

The roles of private sector regarding the delivery of AI services are not well developed in Bangladesh. The introduction of private sector involvement in the provision of AI services has been started since 2001 in collaboration with the government. Since the government is not able to reach their service to all of the farmers the private sector involvement is rationalized who will work in cooperation with the government. In this regards, an agreement had been signed in 2001 between government and BRAC (agreement: SL NO:-A-34/part I/2001/2135/15 Date on 10/12/2001). This agreement provides a framework of how the private sector will work in reaching their AI services to the cattle farmers. The framework describes the following aspects (DLS, 2001).

- The private sector is only allowed to establish their AI points at least 8 km far from the existing government AI points.
- The location of private AI point should be approved by the government.
- Private sector will use their own semen as well as AI materials and will charge the farmers according to their own price policy.
- The private sector will give a monthly report on 30<sup>th</sup> of the month to the Assistant Director (AD) of the District Artificial Insemination Centre (DAIC) and then the centre will send the report to the respective office of the DLS within 5 of the next month.
- AD should monitor the AI programme operated by the private sector and will give technical advice.
- Without the prior permission of the DLS, no other private organization except BRAC is allowed to conduct the AI services.

#### *4.1.3 Role of cooperatives and farmers organization*

These organizations provide the best structure for the development of AI services. Cooperatives assist the farmers in a number of ways including reduction in the cost of AI and drugs and in the collection and marketing of products (milk and meat). Cooperatives also provide information services and education programmes for members. Bangladesh Milk Producers Cooperative Union (Milk Vita) is playing a model role in cooperatives. This cooperative is very successful. The reasons for success is due to improved breeding especially AI and management practices, in addition of market link (ICAR, 2002).

Where cooperatives are not functioning, the formation of other organizations such as “Service Committees” should be encouraged. These must include all stakeholders (actors). Their tasks would be to determine how the farmers can be served in the best way and to assist with the resolution of problems related to AI. In time, these committees should be gradually replaced by farmers’ organizations.

### **4.2 Institutional linkages and development of services**

Good communication and cooperation are needed between AI centres, herd recording organizations, farmers’ organization, breed societies, research organizations and government or other authorities involved in AI programmes and services. The AI organization should work with these stakeholders in providing good information to farmers on the AI service itself, genetic improvement, sanitation and hygiene, farm economics, fertility, the bulls, breeds and quality of semen available, and the progeny test scheme. All these organizations should be involved in an integrated programme of education of farmers. Cultural aspects need to be taken into account when AI is being advocated to traditional farmers for whom breeding cattle and the ownership of bulls’ forms and important part of their way of life.

Development of services includes the improvement of infrastructure, ways of making government and private AI centres cost effective, the question of privatization, and economic management of the service. Cooperative ownership of centres is one approach. Fertility results need to be good to convince farmers of the advantages of AI. Consideration should be given to provide adequate incentives to the inseminator to increase the coverage of AI as well as its effectiveness. Such incentives could be on the basis of the number of inseminations and the numbers of calves resulting from them. Field days (e.g. “progeny days” as in South Africa, with farm visits to give farmers the opportunity of seeing calves borne as a result of AI), brochures and other publicity materials are valuable extension tools.

## 5. Future of the AI services – institutional innovation

It has been predicted that the future of AI continues to be promising (VISHWANATH, 2003). Critical discoveries in the next decades or so in ancillary reproductive technologies will challenge the pre-eminent position of AI as the low cost option to disseminate alleles of choice. In all such cases, the main drivers will continue to remain simplicity of application, probability of success and the level of economy of the technology adopted (VISHWANATH, 2003). For doing so, institutional innovation will be treated as a centre of discussion while taking any development initiatives in providing the AI services.

## 6. Conclusion and policy implication

The review of literature gives privilege to learn lessons by providing the background information in relation to the delivery of AI services to the farmer. This will guide future researchers to identify the gap that can be filled with research or project intervention. In the case of AI service in Bangladesh, several studies have been done in order to evaluate the biological efficiency of AI and its impact. No study has been done in relation to the institutional analysis of cattle breeding especially in the case of AI service in Bangladesh. Therefore, those who wish to conduct the research on institutional and organization will be benefitted with the result of this review study. This study has a policy implication in a sense that the findings of this paper can simultaneously be used by strategic planner and policy maker especially those who are responsible for developing national livestock policy for improvement of the production and uplifting the rural livelihood.

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