Pak. J. Agri. Sci., Vol. 45(2), 2008

ANIMAL HEALTH AND PRODUCTION: A PLANNED INTEGRATION OF TRADITIONAL AND INTENSIVE PRODUCTION IS A VIABLE OPTION FOR SUSTAINABLE GROWTH IN PAKISTAN

Zafar Iqbal, Muhammad Sarwar[1] and Muhammad Nisar Khan
Department of Parasitology, University of Agriculture, Faisalabad
[1]Institute of Animal Nutrition and Feed Technology, University of Agriculture, Faisalabad

INTRODUCTION

Globally, livestock production currently accounts for some 40% of the gross value of agricultural production. In developed countries this share is more than half, while in developing countries, it accounts for one-third of agricultural production. This latter share, however, is rising quickly following rapid increases in livestock production as a result of population growth, urbanization, changes in life styles and dietary habits, and increasing disposable incomes (Steinfeld, 2004). Livestock is a vital component of the livelihoods of both the rural and urban poor in developing countries. In Pakistan, livestock accounts for 52.2 percent of agricultural value added, contributes 11 percent to GDP and affects the lives of 30-35 million people in rural areas (Economic Survey, 2006-2007). Livestock is closely linked to the social and cultural lives of millions of resource poor farmers, which ensures varying degrees of sustainable farming and economic stability. In world trade, animal products represent a value more than double that of grain (Tacher *et al.,* 2000)

Livestock ownership currently supports and sustains the livelihoods of an estimated 675 million rural poor (LID, 1999). The total demand for animal products in the developing countries is expected to more than double by 2030. Conversely, demand for animal products in the industrial world has been stagnating and livestock production in this group of countries is expected to grow only slowly over the projection period (FAO, 1996; Steinfeld, 2004). These general trends, which should continue at least during the next 20 years, are now widely recognized as "the next food revolution" (Delgado *et al.,* 1999). Therefore, developing world is expected to meet the increasing demands of animal food both for itself and for the developed world. Consequently, there will be a strong impact on the organization of livestock production, which will in turn strongly impinge on animal and human health, the livelihoods of the poor and the environment. In the absence of pro-active development policies, the impact of the increased demand for livestock products in terms of increased security of safe food supplies, environmental protection and poverty reduction will be far less favourable (DFID, 2000). Hence, stakeholders in the livestock sector will have to critically revisit the animal production systems of Pakistan. This paper reflects on historical perspectives of animal husbandry, role of traditional and intensive animal production systems in sustainability of livelihood, and some issues and proposed actions in future to meet the challenges confronted by the livestock sector in Pakistan.

Livestock–a historical perspective

More than an economic enterprise, livestock keeping is a centuries-old, inviolable tradition of ancient India. Some of the most important cultural and religious institutions and traditions of the Hindus are linked to domesticated animals. Domestication of dogs, buffaloes, elephants, and fowls occurred in India between 6000 and 4500 BC. The people of these civilizations had both humped and humpless cows, buffaloes, elephants, goats, fowl, etc. Cattle husbandry was well developed during the Rigvedic period (1500–1000 BC) and the cow (Kamdhenu) was adored and considered the 'best wealth' of mankind. Aryans laid great emphasis on protection of cows (see Schwabe, 1978 and Randhawa, 1980). Atharvaveda provides interesting information about ailments of animals, herbal medicines, and cure of diseases. Shalihotra, the first known veterinarian of the world, was an expert in horse husbandry and medicine and composed a text Haya Ayurveda. During Mahabharata period (1000 BC), Nakula and Sahadeva, the two Pandava brothers were experts of horse and cattle husbandry, respectively. Lord Krishna was an expert caretaker and conservator of cow husbandry. Gokul and Mathura were famous for excellent breeds of cows, high milk production, quality curd, butter, and other products. Buddha was a great protector of all kinds of animals and birds (including game) in ancient India. These descriptions are available in India, a book authored by Megasthenes, the ambassador of Seleucus Nikator, king of Mecedonia in the court of Chandragupta Maurya. The great king Ashoka (300 BC) erected the first known veterinary hospitals of the world (see Iqbal

et al., 2004). He arranged cultivation of herbal medicines for men and animals in his empire and adjoining kingdoms. In a famous text, the Arthashastra (science of economics) composed by Kautilya, the guide and political advisor of emperor Chandragupta Maurya, a lot of information is available about different animal (elephant, horse, and cow) departments, grazing lands, rules of meat science, livestock products like skin and fur, and veterinary jurisprudence (Somvanshi, 2006).

Generations of farmers and herders have, for more than 12 thousand years, developed ingenious farming systems to overcome extreme climatic conditions, geographic isolation and scarcity of natural resources. This patient work has resulted in magnificent reservoirs of globally significant agricultural biodiversity and valuable cultural inheritance. However, many of these systems are now under severe threats from global development challenges, including climate change, rural impoverishment, exodus towards urban areas and exclusion of local economies from international markets, and are at risk of disappearing forever.

Animal production systems: International and Pakistani Scenario

The animal production systems range from 'traditional' low-input management systems in remote rural areas to 'modern' intensive production units where hundreds of animals are kept for the sole purpose of producing food for sale. Numerous variations exist between the two extremes. *The terms 'traditional' and 'modern' are used in a neutral way to differentiate the systems and practices developed by communities from those developed at universities and research stations* (Mathias, 2001). Main differential features of traditional and intensive production systems are presented in Table 1. As far as animal healthcare is concerned, fact is that majority of the animal production systems are somewhere in between traditional and modern veterinary medicine. Some of the features of both are compared in Table 2.

Intensive animal production systems may result in environmental pollution due to degradation of grazing lands, deforestation, loss of biodiversity, greenhouse effect and the production of polluting effluents (Anonymous, 2000). The intensification of animal productions will necessarily lead, in the developing countries as it has in the developed countries, to the use of animals with ever greater performances, and thus to the genetic concentration of domestic species. A loss of biodiversity in domestic animal species will, therefore, necessarily occur, with, as a consequence, the risk of losing potentialities for the future (genetic resistance to certain diseases, etc.). Whereas, traditional livestock farming results in conservation of natural resources as it (i) increases in the pastoral wealth, (ii) develops mixed farming and increases underground water reserves, (iii) upgrades the economy of natural resources following income growth, and, most importantly, (iv) it makes a major contribution to land fertility and the recycling of nutrients.

In Pakistan, smallholders and landless farmers contribute major share to the livestock production. These farmers still have heavy reliance on the traditional livestock farming. Though, extremely minor share, there is a tendency of the investers and large scale farmers, towards a realtively bigger livestock farms for the last few years. Thus, it is exepected that there will be a gradual increase in the contribution of intensive production systems in Pakistan in near future. This is a result of realization of the potential and opportunities in the livestock sector in Pakistan. However, there is a need to understand also that the major contributors (smallholders and landless) do not afford to switch to the intensive animal production due to financial and inaccessability constraints (see features in Table 1 and 2). Therefore, in the efforts of increasing animal production, the major contributors must be taken on board. For this purpose, indigenous knowledge should be documented and where required, value be added to the traditional animal husbandry practices using modern technologies. This can be achieved through mass communication and education-awareness participatory programs. Some of the major issues and required actions related with livestock sector in Pakistan are presented in Table 3. Likewise, some of the research questions (Table 4) warrant immediate attention of the academia, researchers and other stakeholders.

Traditional methods: a guarantee for sustainability?

Sustainable development is an idealistic concept, which originated from 'Our Common Future', the 1987 report by the United Nation's World Commission on Environmental Development (Anonymous, 1987). The term 'sustainability' has been interpreted in different ways, but the popular and appropriate definition is 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'. Thus, sustainable development is a process of redirection, reorientation and reallocation. It is a fundamental redesign of economic, technological and sociological processes; a redesign with the aim of affecting change which will ensure a better future for all.

Sustainable medicine (SM), for an example, is a new approach to practising medicine, one that meets not

Table 1. Main features of traditional and intensive animal production systems

	Traditional management	Intensive production
Goal	Minimization of risk	Maximization of profit
Means	Integration, e.g., agriculture and animal production, keeping several species, placing a few animals with neighbours	Specialization and automatization, e.g. chicken farm, large dairy production
Investments	Low; optimises investments rather than production	High; maximises production
Breeds	Mostly local multipurpose breeds	Mostly high performance breeds
Purpose of animal production	• Food, fibre, fertilizer and fuel • Cash income • Draught power and transportation • Savings account • Buffer against crop failure and other risks • Employment • A way to access and use common property • Support for the social network and culture	Production of food for sale
Effect on environment	Sustainable use of vegetation and resources which have no other use	High use of energy, production of large amounts of animal wastes
Labour/capital	Labour intensive	Capital intensive
Flexibility	High	Low
Dependence on inputs from outside	Low	High
Market orientation	Low	High

Modified after Hooft (1999)

Table 2. Some features of traditional (ethno) and modern veterinary medicine

	Ethnoveterinary medicine	Modern veterinary medicine
Integration	Integration with culture, religion and other aspects of a community's life; animal healers often also treat humans, and human healers treat animals	Separation from animal husbandry, human medicine, pharmacy, and religion
Approach	Holistic: treats whole patient	Treatments often target specific organs
Diagnosis	Depends mostly on observation and the senses	Hightech methods play important role
Prevention and treatment	Stimulates immunity and improves the general condition	Seeks to control micro-organisms

only our current needs but will also meet the needs of succeeding generations. The concept of SM derives from the concept of sustainable agriculture, which has been practised for several decades. SM is a system that aims to maintain the health and well-being of people and animals well into the distant future. It defines sustainability in terms of resource availability and functional integrity, i.e., retaining the capacity of each of the component parts to function normally (Lin *et al.*, 1998; 2003). The concept of sustainable medicine fits well into the vision of the Food and Agriculture Organization of the United Nations (FAO), which defines sustainable development as 'the management and conservation of the natural resource base, and the orientation of technologies and institutional change in such a manner as to ensure the attainment and continued satisfaction of human and animal needs for present and future generations'.

There is uncritical acceptance of traditional, indigenous knowledge as `good practice' versus `Western', scientific knowledge as `bad practice'. Traditional or indigenous knowledge is gaining more and more attention, after having often been rejected as a hindrance to development. The main reasons that are given for paying more attention to indigenous knowledge and practices are that these (i) emanate from the cultural context of the people concerned; and (ii) evolve in close contact with specific environmental conditions, and are based on traditional societies' intimate knowledge of their environment (see e.g. Titilola, 1994; Mathias, 1995; Aumeeruddy, 1995

Table 3. Major issues and required actions related with livestock sector in Pakistan

Livestock sector related issues	Action(s) required
Inadequately trained manpower	Manpower should be need- and aptitude based, and be trained in accordance to their choice for carrier development, e.g. research, extension, vaccine production, small/large animals, poultry, private/public sector etc.
Insufficient livestock services	Expansion in livestock services up to union council level, e.g., ambulatory clinics, disease diagnostic labs, artificial insemination centers, farmer's education extension cells, etc.
Insufficient/ low quality vaccines/biologics production	• Increase in funding by the government for expansion in vaccine/biologics research and production facilities • Incentives for establishment of vaccine/biologics production facilities by the private sector
Un-economical/ low quality pharmaceuticals	• Increase in funding by the government for research on local development of drugs • Incentives for establishment of pharmaceutical industries by the private sector
Nutritional deficiency disorders	• Farmer's awareness about nutritional disorders through education extension cells at union council level • Increase in funding for research on fodder crops and non-conventional feed resources • Subsidized supply of feed ingredients
Poor animal genetic resource	• Setting up bio-technology labs in the universities for gene sequencing and embryo development thus identification and conservation of indigenous genetic resource • Improvement of local animal germplasm, and introduction of locally viable imported animal breeds • Improvement and expansion in provision of quality artificial insemination services • Offering incentives to the private sector for multiplication of highly productive animal breeds
Instable markets	• Strengthening local markets through farmers associations and regulation of demand and supply of animal products • Addressing quality issues of animal products by setting up quality standard labs at district level and exploiting international markets
Insufficient investment	• Increasing diversity of bank credit schemes for food animal farms, e.g., dairy animals, meat animals, poultry, etc. • Increasing diversity of bank credit schemes for animal product/ by-products processing industries
Non-adoption of the farmers to modern technologies	• Establishment of farmer's education extension cells at union council level • Documentation and scientific validation of traditional veterinary/animal husbandry practices
Inadequate/non-implementation of legislation	Formulating new legislation on ethics of livestock husbandry, and limiting the farmers to keep the recommended animal breeds with high genetic potential for different purposes like, milk, meat, etc.
Poor linkages among the researchers, field staff, farmers, industry and the end users	Establishment of central linkage department in the universities with sufficient funding to carry out the activities of linking all the stake holders in livestock and thus formulating policies, and addressing emerging issues.
Decision making: traditional *vs* intensive animal production systems ?	• Requires an integrated approach keeping in view the farmer. • Conservation, value addition and application of traditional knowledge in animal husbandry practices

Table 4. Research questions in animal health and production

Nature of research	Research question
Basic Research	• Inventory of the stakeholders in livestock sector ? • National scientific data on: o Health issues and associated losses ? o Production issues and practical solutions ? o Animal diversity and germplasm ? • Diversity, market potential and significance of livestock products ? • Issue of livestock and livestock Assessment of local SPS standards for domestic consumption and international trade ? o Food safety labs ? o Animal welfare standards ? o Awareness of farmers and technical staff ? o Curricula ? • Clearly defined responsibilities ? o Livestock and Dairy Department ? o Universities ? o Boards/commissions/task force
Extent of adoption of known technologies	• Concrete list of the interventions/technologies employed for enhacing animal health and production ? • Impact assessment of the employed interventions/ technologies ? • Identification of known technologies for adoption ?
Reforming institutional arrangments of delivery of inputs and services to bridge yield gap/increase productivity	• Revision of curricula and providing better training facilities for the students • Independence of acdemic programs in the universities in view of legally protetcted rights of Pakistan Veterinary Medical Association (PVMC) and Higher Education Commission (HEC) in the name of uniformity in DVM programs ? • PVMC and HEC should restrict to maintaining a uniform high standard of the graduates produced by introducing state board type of examination for all the graduates instead of interfering in the degree programs and/or curricula ?
Policy research	Does a livestock ploicy exist in Pakistan ? If not, it should be formulated.

Basiago, 1995). These reasons imply that indigenous knowledge is almost an essential condition for sustainable development. This concept so often, particularly in the developing world, leads sometimes to implicit-assumption that modern, `western' methods and technology will never generate sustainable development nor lead to improving the situation of the world's poor, and that their impact on the environment is in fact negative. Fact is that both traditional and modern approaches be considered for their value and the problems associated with them. By doing so, traditional and modern methods may be placed in a more balanced perspective.

CONCLUSIONS

In the light of above discussion, it is concluded that traditional knowledge should not be simply conserved so that traditional methods will always be applied. Instead, it should be documented and value added so as to build a broader basis from which we can choose--so that we can assess all the knowledge available from every source and then pick what is best suited to the case at hand in different situations. Most often the best choice will be a combination of traditional and new methods--a combination that is specific to a particular

site, culture and project. Pretty *et al.* (1995) have pointed out that the best combination of methods will change as conditions change and/or other techniques become available. Traditional knowledge, just like scientific information, of course can be applied only if and when it is available. But it is promising to read accounts of real cases where traditional and modern knowledge have been successfully combined (e.g. Belal 1989; Manshoff and Farber 1995).

REFERENCES

Anonymous. 1987. Our Common Future, Report of the World Commission on Environment and Development, World Commission on Environment and Development. Published as Annex to General Assembly document A/42/427, Development and International Co-operation: Environment August 2, 1987.

Anonymous. 2000. Livestock Sub-Sector Strategy Paper, DG Development–Rural Development and Food Security http://europa.eu.int/comm/development/rurpol/ (accessed on January 06, 2008).

Aumeeruddy, Y. 1995. Perceiving and managing natural resources in Kerinci, Sumatra. Nature and Resources. 31(1): 28-37.

Basiago, A.D. 1995. Sustainable development in Indonesia: a case study of an indigenous regime of environmental law and policy. Int. J. Sustainable Dev. Wld. Ecol. 2(3): 199-211.

Belal, A.E. 1993. Sustainable development in Wasi Allaqi. Desertification Control Bulletin, 23: 39-43.

Delgado, C., M. Rosergrant, H. Steinfeld, S. Ehui and C. Courbois. 1999. *Livestock to 2020:* The Next Food Revolution. Food, Agriculture & Environment Discussion Paper 28, IFPRI/FAO/ILRI, IFPRI, Washington D.C. http://www.ifpri.org/2020/dp/dp28.pdf

DFID, 2000. Halving world poverty by 2015, economic growth, equity and security. Strategies for achieving the international development targets. DFID Strategy Paper. http://www.dfid.gov.uk/Pubs/files/tsp_economic.pdf

Economic Survey. 2006-07. Economic Survey, .Government of Pakistan, Islamabad.

FAO. 1996. World livestock production systems: current status, issues and trends. FAO Animal Production and Health Paper 127, FAO, Rome.

Hooft, Katrien van't. 1999. Relation between ethnoveterinary and western knowledge in family-level livestock keeping (examples from Bolivia). In: E. Mathias, D.V. Rangnekar and C.M. McCorkle, with M. Martin (eds.). Ethnoveterinary Medicine: Alternatives for Livestock Development–Proceedings of an International Conference Held in Pune, India, 4-6 November 1997. Volume 1: Selected Papers. BAIF Development Research Foundation, Pune, India. pp. 25-29.

Iqbal, Z., G. Muhammad, A. Jabbar and Z.D. Sindhu. 2004. Veterinary Education in Pakistan: Past Scenario and Future Requirements. Int. J. Agri. Biol. 6: 753–757

LID. 1999. Livestock in Poverty-Focussed Development. Crewkerne, Somerset, UK.

Lin, J.H., P.A.M. Rogers and H. Yamada. 1998. Chinese herbal medicine: pharmacological basis. *In* Complementary and alternative veterinary medicine: principles and practice (A.M. Schoen & S.G. Wynn, eds). Mosby Inc., St. Louis, 379-404.

Lin, J.H., K. Kaphle, L.S. Wu, L.S., N.Y.J. Yang, G. Lu, C. Yu, H. Yamada and P.A.M. Rogers. 2003. Sustainable veterinary medicine for the new era. Review Scientific and Technical Office Int. Epizoot.22: 949–964.

Manshoff, C. and S. Farber. 1995. An economic analysis of ecological agricultural technologies among peasant farmers in Honduras. Ecol. Econ.12(3): 237-248.

Mathias. 2001. What is ethnoveterinary medicine? http://www.ethnovetweb.com/whatisevm.htm (accessed on 20-10-08)

Mathias, E. 1995. Framework for enhancing the use of indigenous knowledge. Indigenous Knowledge and Development Monitor. 3(2): 17-18.

Pretty, J.N., I. Guijt, P. Shah and F. Hinchcliffe. 1995. Joint watershed management: new evidence from the New Horizons project. Indigenous Knowledge and Development Monitor 3(1): 10-12.

Randhawa, M.S. 1980. A History of Agriculture in India. Volume 1. Indian Council of Agricultural Research, New Delhi 110 001, India. pp.541.

Schwabe, C.W. 1978. Cattle, Priests and Progress in Medicine. University of Minnesota, Minnesota, USA.

Somvanshi, R. 2006. Veterinary medicine and animal keeping in ancient India. Asian Agri-History, 10: 133–146.

Steinfeld, H. 2004. The livestock revolution–a global veterinary mission. Vet.Parasit.125: 19–41.

Tacher, G., L. Letenneur and E. Camus. 2000. A perspective on animal protein production in Sub-Saharan Africa. Annals of the New York Academy of Sciences. 916: 41-49.

Titilola, T. 1994. IKS and sustainable agricultural development in Africa: essential linkages. Indigenous Knowledge & Development Monitor, 2(2): 18-21.