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ScienceDirect
Livestock Science 106 (2007) 1–18
LIVESTOCK SCIENCE
www.elsevier.com/locate/livsci

Review article

Perspectives on animal production systems in Asia

C. Devendra

Consulting Animal Production Systems Specialist, 130A Jalan Awan Jawa, 58200 Kuala Lumpur, Malaysia

Received 8 May 2006; received in revised form 8 May 2006; accepted 8 May 2006

Abstract

Asian animal production systems are discussed in the context of their relevance, types, trends, opportunities for productivity enhancement, and the implications for natural resource management (NRM). These include a variety of systems in agro-ecological zones which can be grouped broadly into one of three categories: landless, crop-based and, and rangeland-based. The landless production systems are of two types: (i) highly industrialised pig and poultry production, and (ii) extensive systems involving small ruminants, cattle and camels and resource-poor nomads, transhumants or agricultural laborers and seasonal migrations. Within crop-based systems, animals are found in both irrigated and rainfed areas. The genesis of these systems is illustrated, and includes two broad categories: systems combining animals with annual or perennial cropping. The significance of crop–animal interactions and economic benefits from 31 case studies in 11 countries highlight the importance of animals in crop-based systems. Animal production trends are influenced by strong demand-led factors such as population growth, urbanisation, income growth and changing consumer preferences These are of two categories: (i) modern, demand-driven and capital intensive non-ruminant (pig and poultry) sector which is dominant, growing, and supplies the major share of animal proteins,which however is unable to meet current and projected human requirements, and (ii) traditional resource-driven and labour intensive ruminant (buffaloes, cattle, goats and sheep) sector which mainly involve small farms and small farmers and are lagging. The disparity questions efficiencies of prevailing animal production systems and NRM. Integrated animals–tree crop production systems are underestimated and are potentially very important. Two possible scenarios for the future of crop–animal systems are increased size and specialisation, and the other disintegration due to population pressure. It is suggested that crop–animal systems and small farms will continue to be predominant in Asia, in which intensification, growth and increased contribution are likely in the future. Major issues to be addressed across systems include *inter alia* nutrient flows, waste disposal, overgrazing, all year round feeding systems, zoonosis, and policy issues. The less-favored and more constrained rainfed areas can be made more productive through increased public and private sector investments, interdisciplinary research and development, and improved technology application. The challenges and benefits for the future include improved efficiency of NRM, agricultural growth, reduced poverty, improved livelihoods of the poor and environmental sustainability.

Keywords: Animal production systems; Crop–animal systems; Types; Trends; Economic benefits; Productivity enhancement; Interdisciplinary research; Asia

E-mail address: cdev@pc.jaring.my.

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doi:10.1016/j.livsci.2006.05.005

1. Review methodology

The review is based on an extensive perusal of published articles in books, journals, proceedings of conferences, and also unpublished reports in Asia. In addition, there was a search through the CABDirect database using the above key words involving 197 records between 1974–2005, which further enabled the use of references obtained by this method to include pertinent data. The review process also built on earlier detailed assessments and analyses of crop–animal systems in South East Asia (Devendra et al., 1997), and South Asia (Devendra et al., 2000).

2. Introduction

Asian animal production systems involve a variety of systems that are found across the continent to include the arid and semi-arid, humid and sub-humid, and highland and temperate regions. Animals are found within these various agro-ecological zones (AEZ). The AEZs involve a great diversity in land use patterns and a wide range of biophysical environments, animals and animal production systems play a most important role in food production, supporting and enhancing crop production, as well as contribute towards income, generation, food security and livelihoods of the poor. This role is however especially significant in mixed farming systems which form the backbone of Asian agriculture, with an emphasis is on crop production.

The justification for enhancing and increasing animal production in Asia is linked directly with the need for more animal proteins. This is associated with a region that is experiencing a rapidly changing external environment with such factors as rapid population growth, urbanisation, increased incomes, demand-led processes, and changing consumer preferences for foods of animal origin. The projected total meat and milk human consumption levels in 2020 are far in excess of anticipated supplies and place unprecedented pressure on the management of the natural resources (crops, animals, land and water).

The contribution by components of the animal industries, the efficiency and capacity of individual animal production systems is compelling and is in question. The question that is being asked is what are the approaches to, and opportunities for improving animal production systems and significantly increasing the productivity from animals in the future in Asia?

The purpose of this paper is to focus discussion on the production systems and resources, types and trends of the systems and implications for NRM. It highlights the opportunities and challenges for productivity enhancement, and major issues that merit R&D attention. The review also examines prevailing and emerging scenarios concerning the future of Asian animal production systems. It will be have interest and use to practitioners, planners and policy makers concerned with NRM and agriculture.

3. Role and contribution of animals

Individual animal populations in Asia are diverse and relatively large. These are widely distributed across small farms, which are the reservoirs of a large proportion of the main animal species (buffaloes, cattle, goats, sheep, chickens, pigs and ducks). Table 1 gives an idea of the diversity of available

Table 1
Distribution of domestic animals by ecosystem and sub-region in Asia (Devendra, 1995a)

Sub-region	Agroecosystem and animal species										
	Lowland irrigated			Lowland/upland rainfed			Semi-arid and arid			Highland	
	Buffalo/ cattle	Goats/ sheep	Pigs/ poultry/ ducks	Buffalo/ cattle	Goats/ sheep	Pigs/ poultry/ ducks	Buffalo/ cattle	Goats/ sheep	Pigs/ poultry/ ducks	Buffalo/ cattle	Goats/ sheep
China	***	*	***	**	***	***	*	***	*	**	***
Hindu-Kush	***	*	**	**	***	*	*	_	_	*	***
South Asia	***	*	**	**	***	**	*	***	_	*	*
Mekong countries	***	*	***	**	**	***	**	*	_	*	*
South East Asia	***	*	***	**	**	***	*	**	*	*	*