

## FARM ANIMALS AND HUMAN SOCIETY

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### Summary

Animals have been a crucial part of human society since the beginning of time. Domestication of animals represented a significant advance in human development. In our modern world, humans still rely greatly on domestic animals. This is especially true in developing countries, where animals provide people with many more essential products beyond meat. The challenge for future generations lies in increasing animal production systems to provide an increasing human population with needed animal products while balancing issues such as animal welfare, animal health, breed conservation, and environmental integrity.

### 1. Introduction

Animal products have always had a crucial role in human society. Animals have been hunted for their meat, bones and hide. In early human history, animals ensured human survival, providing food, tools, shelter, and clothing. Hunting animals to obtain products of survival required significant effort however, and in many instances was either dangerous or unsuccessful. Domestication of animals provided a solution to each of these problems. By domesticating and farming animals, people were able to ensure a regular supply of animal products, enabling a more sedentary, agriculturally based lifestyle. Over time, the practice of selective farm animal breeding maximized specific useful qualities found in various breeds and breed combinations.

Many species of animal have been domesticated and are currently used for production purposes. Some are favored for their meat, others for their wool, milk, or eggs. Animal products also have numerous applications in human medicine and pharmacology. Most species are multi-functional, providing a number of products useful to people. Modern animal production systems are complex, involving highly technical animal husbandry. Raising farm animals on a large scale requires a detailed understanding of biological processes at the molecular level. All aspects of breeding, feeding and animal health have made numerous scientific advances, allowing for greatly increased and efficient animal production systems.

The progress achieved in farm animal production has also raised complex issues. The long-term environmental impacts and sustainability of intense animal production systems are questioned. Questions also revolve around issues such as animal and human health, animal welfare, and conservation. The needs of modern animal production systems relative to the needs of developing countries are also of concern. The following sections discuss the role of farm animals in human society. Various issues relevant to farm animal production are also presented.

### 2. Products of Animal Origin and Human Society

Since prehistoric times, animals and animal products have been a part of the human environment and heritage. Human history is full of indications of the significant role which animals have played in maintaining life and contributing to human development.

A major activity for early humans involved hunting animals as a source of food, fuel for heat and light, skins for clothing, and bones for tools.

Humans have the capability and desire to control, use and even modify other species to meet numerous human needs. Most of the animal products of human importance come from species that have been domesticated. Domestication of an animal for the conversion of its products or services to human advantage and purposes involves taking total control of the animal's growth and reproduction. Domestication is distinguished from 'taming', which implies not total control but only the subduing of the animal's instinctive desire to flee. Animal domestication is a component of the whole process of agricultural development that commenced in approximately 15 000 B.C. It was at approximately this time that the transition was made between nomadic humans as hunter/gatherers to sedentary humans as farmers. Today, animals are produced and utilized for companionship, food, power and transport, and materials, in all societies and geographic locations.

## **2.1. Food Products**

Animals provide a unique source of foods that have high nutrient density and palatability. As purchasing power in a society increases, so does per capita consumption of animal products. For example, per capita consumption of animal products in USA steadily increased during the twentieth century. This trend has been observed in other developed countries, such as those of Western Europe and Japan. After the reconstruction that followed World War II, animal product consumption rose rapidly. Countries that have not made significant economic progress, such as the countries of Eastern Europe and the former Soviet Union, do not reflect this trend. Diets in these countries continue to carry high proportions of cereals and root crops, since animal products are less available and more expensive. In much of the global diet, animal product consumption is low due to very low family incomes. Diets in impoverished countries consist largely of cereals (rice, sorghum, maize), root crops (yams, sweet potatoes, peanuts, cassava), and pulses (beans, chickpeas).

### **2.1.1. Meat**

Since prehistoric times, humans have hunted and killed animals to provide meat to eat. Several species of wild animals were consumed, including fish and mollusks. Fish, crustaceans and mollusks still represent a significant part of the human diet. For the most part, these water species are harvested by hunting but to an increasing extent they are being farmed and cropped in a more controlled way.

Today the range of species produced and consumed as a source of meat is very large, and includes species such as cattle, buffalo, sheep, goats, pigs, horses, chickens, ducks, ostrich, deer, reindeer, rabbits, llama, and guinea pigs to name a few. Although the muscular and fatty parts of animal carcasses are mainly consumed, hearts, livers, kidneys, eyes, and the brain are also consumed.

In many parts of the world, large animal species are not as useful to the farmer as the smaller species. Although large animal species provide more meat per animal

slaughtered, this may be a disadvantage. Lack of transport, markets, storage facilities and communications mean that if an animal is killed, the farmer, his family and some immediate neighbors will probably consume it. Any meat immediately surplus to these needs will be wasted. In addition, feed maintenance needs of a large animal may draw heavily on limited resources, particularly during periods of drought and animal feed shortage. Smaller species do not need to be maintained for as long a period before slaughter, and may be more efficient in terms of feed inputs per unit of meat produced.

### **2.1.2. Milk**

Another very important major food commodity derived from animals is milk. Only at a relatively late stage of development when humans were able to handle fairly docile animals were regular supplies of milk attainable. Several species yield significant amounts of milk for human consumption, including cows, llamas, buffalo, sheep, and goats.

The quality of milk deteriorates rapidly unless it is subjected to one of several forms of heat treatment, such as pasteurization. Several products are made from milk, such as butter, cheese, yogurt, and cream. These products conserve the essential nutrients in milk and can be stored, sometimes for periods of up to several months, with little deterioration. Milk can also be dried to produce whole milk powder. In this form, it has a long storage life and can be easily transported.

### **2.1.3. Avian and Other Eggs**

Eggs are another important group of animal products. It is assumed that humans first gathered eggs, found incidentally during the course of hunting. Only later did humans keep birds for egg production.

Although eggs are produced primarily from chickens, the eggs of other species such as ducks, geese, quail, and plovers are also eaten in quantity. Egg consumption is not limited to avian sources; the eggs of other species are also eaten. Caviar, considered a delicacy, consists of the eggs of the sturgeon. Eggs of sea turtles are also eaten.

## **2.2. Power and Transport**

Over time, several species of animals have been used as a source of power and transport. The archaeological evidence suggests that cattle were probably the first species to be used for these purposes. The early forms of harness were developed on cattle, and subsequently transferred and modified for other species. Although the horse is considered to be the first animal on which specific riding techniques were developed, other species such as cattle, elephants and camels were also used for carrying people.

The development of motors has considerably reduced the need for animal power and transport in several regions of the world. However, there are still many parts of the world where motor power is inappropriate. Areas in which fuel availability is limited or road networks are absent still require animal power. Animals for power and transport are also preferred in mountainous terrain and paddy fields.

## **2.3. Materials**

### **2.3.1. Bone and Skin Products**

Both in historic and modern times, animals have been the source of a range of materials used for clothing, tools, adornment, domestic utensils, and furnishings. Historically, the remains of animal consumption, predominantly bones and horns, provided materials that could be used for making digging and cutting tools, as well as simple ornaments, such as buttons. Animal skins were used to make clothing, simple containers for storing food items, instruments, footwear, and thonging for tying.

Today, leather (consisting of animal hide without the fiber) is still used to make a wide range of goods, although the advent of plastics has substantially decreased the demand for leather. Furs from many animals are used for clothing and furnishings. Fibers such as wool, mohair and cashmere are obtained from animals such as the sheep, alpaca, llama, Angora goat, vicuna, and guanaco. These fibers have many applications in the manufacture of clothes, furnishings and carpets.

Humans have extensively used feathers obtained from birds. Tribes throughout the world use bird feathers of many species to make colorful jewelry and adornment. Feathers have also been used to provide writing and painting tools, as well as for making artificial baits for fishing and hunting. Today, feathers are still used for adornment, particularly feathers of the ostrich and peacock, which have been prized for several thousands of years. Commercially, feathers obtained from chicken, geese, and ducks, are used for making cushions, pillows and bedding, as well as insulated clothing.

### **2.3.2. Fuel, Feed, Fertilizer and Building Materials**

Since prehistoric times, animals (including marine mammals) have been used as a source of fats and oils for both cooking and lighting. Today, reliance on animal products for these purposes has almost disappeared.

Animal materials are now used in increasing quantities as a source of nutrition for animal feeds. Animal fats are used in livestock feeds due to their high-energy value. Blood and meat and fish meals, exposed to heat treatment to kill disease organisms, are also used as ingredients in diets for cows, pigs and poultry.

Animal waste is another animal material with several applications. It has three principal uses: as a fuel, as a fertilizer, and as a building material.

In dried form, the wastes of several species including camel, yak, buffalo and cattle are burned directly as a fuel source for cooking and heating. This practice is still common in parts of Asia, North Africa and the Near and Middle East. Animal wastes also produce methane gas, which can either be used directly as a fuel source or indirectly for various purposes including the production of electricity. In India and other countries, methane produced in digestors fed with animal and human wastes fuels many small domestic generators.

In several parts of the world, animal wastes are mixed with mud and clay to construct dwellings. Such mixtures are made into bricks (sometimes with the addition of straw or other fiber), or used like cement to cover frameworks made from twigs, heavier pieces of wood and thonging.

Animal wastes and remains are very useful when applied as fertilizers to replenish the nutrients of the soil. However, modern use of animal wastes has declined as fertilizers of chemical origin have been developed and used extensively throughout the world. With the increased use of chemical fertilizers, animal wastes are treated as a by-product to be disposed of as cheaply and easily as possible, with the result that they have been the cause of considerable water and air pollution.

#### **2.4. Other Uses of Animal Materials**

Animal fats and oils are currently used to make soap and other cosmetics, in addition to food items, biodegradable detergents, other chemicals and lubricating oils. Animal products are also used as a source of drugs for use on humans. Many vaccines are produced on animal tissue and on chicken eggs.

Another animal product used in the textile industry is silk, produced by silk worms. It is thought to have been developed in China around 3000 B.C. Silk production currently occurs in several different countries, involving up to a dozen or more species of moth.

### **3. Animal Husbandry in the World**

Good animal husbandry is the main essential for success in the management of animals of all species. Animal husbandry generally refers to all aspects of animal production, including rearing, feeding and breeding. Animal rearing (animal housing, care, etc.) will depend largely on the species being raised, the geographical region, and the scale of the production operation. Animal feeding is discussed in section 8, so the focus of this section will be on animal breeding.

The successful management and production of animal species in the long term essentially revolves around breed development. Ever since domestication, humans have tried to improve animals so that they more closely satisfied various needs. Animals were developed to produce several products, and certain animals were evolved having certain distinguishable characteristics. These are now known as breeds.

Breed development is based on how breeders design matings. Breeders around the world will always select what they hope are the best animals. Livestock and poultry producers through the ages (and around the world) have observed that some animals were more adapted to certain areas or production situations than others. A producer raising sheep in rough, mountainous land may have observed that certain sheep in his flock were more adapted to the rocky terrain. They were more sure-footed than others, would graze faster and closer, and therefore could produce more wool. He and other sheep producers in the area naturally saved offspring of these particular sheep and not of the others, so in time there may have developed a sheep breed with excellent wool production in that particular environment.

Examples such as this have been repeated in some way hundreds of times, among all livestock and poultry species, and in nearly every country on the globe. As a result, most breeds have developed from animals that were particularly well adapted to a specific environment, producing in that environment the kind of product desired.

There is considerable pride associated with breed development. Those who have been responsible for development and maintenance of a breed strive for an ideal in breed type, those characteristics that help make the breed unique, at least in color markings and other obvious traits, as well as in production characteristics. This pride is passed on, through generations of breeders, and has persisted for centuries.

### 3.1. Selection and Mating

Although short-term results are observed at the level of individuals, the purpose of animal breeding is not to genetically improve individual animals. The goal is to improve future generations of animals by improving animal populations [which consist of a group of inter-mating individuals]. In order to achieve this, selection and mating decisions made by the breeder are crucial. The selection process involves deciding which individuals become parents, how many offspring they may produce, and how long they remain in the breeding population. Selection must take into consideration why the livestock are being raised, especially if the goal includes family nutrition or the requirements of the market. Protection of genetic diversity and indigenous breeds is critical for livestock; selection to enhance growth and productivity should not undermine natural disease resistance or adaptation to the local environment. The mating process is more specific, as the breeder selects which of the males will breed with which female/s.

Whenever possible, breeds that are adapted to the local area should be used. Although upgrading the genetics of local breeds is one of the primary goals of many subsistence farmers, the widespread importation of exotic animals should not be encouraged. If good breeds cannot be found locally, semen or a breeding male can be shipped from a nearby country. Crossbreeding helps animals retain much of their natural disease resistance and adaptation to the local environmental conditions.

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### **Biographical Sketch**

**Isabel Martinez-Welgan** obtained a Bachelor of Science in 1991 and a Master of Natural Resources Management Degree in 1999, both from the University of Manitoba, located in Winnipeg, Canada. She has a background in animal science and wildlife management. As an independent researcher, Isabel Martinez-Welgan specializes in investigation of impacts on wildlife populations resulting from industrial activities. She resides in Winnipeg, Canada with her husband and six children.