FARM ANIMAL SCIENCE

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Keywords: beef cattle, dairy cattle, swine, sheep and goats, horses, poultry.

Contents

Summary

In general, farm animals convert and/or harvest material that is not of much use for monogastric humans or convert excess grain products into meat, milk, eggs, animal by-products and wool fiber that are extremely useful to mankind. These food products also have a high nutritive value since their amino acid composition is similar to what is required by humans. As countries develop economically, there is almost always a correlation with an increase in desire for more animal products in their diet. For more detailed information on specific species see other sections of this encyclopaedia entitled: *The Dairy Industry*, *World Beef Cattle Production*, *Sheep Production*, *Overview of World Swine and Pork Production*, *Poultry Products as Food*, *Undomesticated Food Animals Hunted as Used for Food*, *Undomesticated Animals Raised in Enclosures, for Food, and Domesticated Animals Used as Food That Are Sometimes not Considered as Acceptable Food Animals in Some Parts of the World*, *Veterinary Medicine*, and *The Role of Meat in the Human Diet*.

1. Introduction

Animals have always contributed to human societies by supplying food in the form of meat, milk, fat, eggs and in some societies, even blood. These products are nutritionally-dense and the amino acids are in the ratio required by humans including the essential amino acids. Body covering in the form of wool, leather, pelts, hides, hair and fur have also been supplied by these animals. Draft animals supply work in the form of cultivation, transportation, and pleasure. Animal body waste in the form of field fertilizer, fuel, and construction materials is also important. Other miscellaneous contributions such as storage of capital, food, buffering for fluctuating grain prices, soil fertility, income, slaughter by-products, recreation, and pets are also important. In Table 1 can be found the approximate number of livestock in the world utilized as food. They contribute approximately 16% of

the calorie input in human food, on a worldwide basis, and 35% of the consumable protein. Equivalent figures for USA are 34% and 69%. The major farm animals comprise cattle, sheep, pigs, goats, buffalo, horses, asses, mules, camels, chickens, turkeys, and ducks. Some of the details of their scientific classifications are given in Table 2.

Animals	World (1000 head)	Africa (1000 Head)	Asia (1000 head)	South America (1000 head)	Europe (1000 Head)	U.S. Totals 1000 head)
Chickens	13,628,000	1,125,000	6,752,000	1,520,000	1,844,000	1,540,000
Cattle	1,330,000	203,500	479,000	297,000	157,000	98,500
Sheep	1,066,000	213,000	417,000	87,000	162,000	7,240
Hogs	956,000	22,000	579,000	58,000	199,000	62,200
Ducks	752,000	15,000	650,000	12,000	59,000	---
Goats	705,000	183,000	469,000	22,000	18,000	---
Turkeys	246,000	7,000	13,000	11,000	110,000	283,500
Geese	209,000	11,000	185,000	---	13,000	---
Buffalo	169,000	3,150	164,000	1,700	220	---
Horses, Asses, Mules	120,000	20,000	45,000	23,000	8,750	---
Camels	20,000	15,000	5,000	---	11	---
Total Large Animals	4,330,000	652,000	2,158,000	490,000	527,000	168,000
Total Poultry	14,900,000	1,580,000	7,600,000	1,543,000	2,026,000	1,823,500

Table 1. Approximate totals of world livestock numbers

Classification	Cattle	Sheep and Goats	Swine	Poultry
Phylum	Chordata	Chordata	Chordata	Chordata
Subphylum	Vertebrata	Vertebrata	Vertebrata	Vertebrata
Class	Mammalia	Mammalia	Mammalia	Aves
Order	Artiodactyla	Artiodactyla	Artiodactyla	Galliformes
Suborder	Ruminata	Ruminata	Suina	Galli
Family	Bovidae	Bovidae	Suidae	Chicken – Phasinanidae Turkey – Meleagrididae
Genus	*Bos*	Sheep - *Ovis* Goat - *Capra*	*Sus*	Chicken – *Gallus* Turkey – *Meleagris*
Species	From temperate zone - *taurus* From tropical zone (humped) - *indicus*	Sheep - *aries* Goat - *hires*	*domesticus*	Chicken – *domestica* Turkey – *galiopavo*

Table 2. Scientific classification of farm animals

The farm animal industry is based on animal nutrition which is influenced by the gastro-intestinal tract of the various types of animals involved, and feedstuff can come in a variety of nutritionally desirable classes. Genetics influences animal breeding and consequently animals have been modified by selection to fulfill specific needs such as animal reproduction, lactation, animal behavior and health.

2. Beef Cattle

Beef cattle are ruminants and consequently can consume forages including grass which contains a great deal of cellulose, the world's most abundant potential feed ingredient. They can also utilize non-protein nitrogen in the synthesis of animal protein. Forages are not easily harvested by man and both forages and non-protein nitrogen are not utilizable by humans. Therefore, these animals convert material that has little value in the human diet to highly nutritious, well balanced, good tasting protein. Beef tissue contains a lot of nutrients per calorie (nutritional-dense) and three ounces of beef supply approximately 50% of the recommended daily allowance. The beef industry is usually divided into segments which are owned by different people and these operations include seed stock producers, cow-calf producers, feedlot for finishing, slaughter and packing facilities, retailers and ultimately consumers. Some of the more popular breeds of beef cattle and production information are listed in Tables 3 and 4. These animals have been selected over time to have an optimum quantity of muscling in the high priced areas of the carcass which gives the animals a blockier conformation than is evident in dairy cattle. In addition to grasses, beef cattle, particularly in USA, are often fed grain which can be consumed by humans and, therefore, cattle in general are often considered inefficient by many since the conversion ratio of nutritive value from grain to meat is rather low. However, the overall picture should be taken into account since much of the animals' diet consists of products that could or would not be consumed (approximately 85% of ruminant diet) by humans. Cattle convert this feed into high quality meat items. From thios perspective, they are tremendously efficient.

Food safety of beef products receives a lot of publicity today and recent concerns over *E. Coli* O157:H7, *Salmonella*, and *Listeria* monocogtogenes, etc. frequently make headlines. However, all of these pathogens can be inactivated by appropriate cooking techniques. Bovine Spongiform Encephalopathy (BSE) is a disease in cattle which is believed to be caused by feeding ruminant derived by-products feeds back to ruminants. Also there is some suggestion that it may be linked to new variant Creutzfeldt-Jakob disease in humans. Prohibition on the feeding of ruminant protein by-products to ruminants seems to be reducing the incidences of BSE. Another major cattle disease would include foot and mouth disease which has been eradicated from some countries but also periodically is reintroduced in countries that have eradicated this problem. This causes great economic loss in the beef industries. Fortunately this disease is not transmitted to humans. In the USA, beef carcasses are inspected for safety and are also graded for quality and yield of edible portion. The higher grades of slaughter beef carcasses are usually from grain-fed beef animals and approximately 83% are 'U.S. Choice' grade.

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Biographical Sketches

Dr. Herbert W. Ockerman is a Professor at The Ohio State University in the Meat Science Area of the Department of Animal Sciences, Columbus, Ohio, USA. He is involved in both food teaching and research and his areas of specialty include, Food Biochemistry, Food Microbiology, Statistics, and International Education. Prof. has received 26 local and national honors as well as 67 international honors from 6 continents. His publications exceed 1,650 scientific and industry focused articles, including 80+ books or chapters in books. He belongs to 24 professional societies and is listed in 56 biographical listings. He has established five International University Endowments and his hobby is shipping textbooks to his alumni around the word who are currently Secretary of Agriculture, numerous University's Deans of Agriculture, numerous Departmental Chairmans, and numerous Faculty members both at Universities, National Research Originations, and Private Businesses. He currently has advised 98 international students from 32 countries and supervised 61 visiting professors from 24 courtiers. He has been invited to give 100+ international presentations, keynote speeches, short courses, and seminars in his discipline.

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