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EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA
CENTRO DE PESQUISA AGROPECUÁRIA DO TRÓPICO ÚMIDO - CPATU

WATER BUFFALO PRODUCTION AND RESEARCH IN BRAZIL

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WATER BUFFALO PRODUCTION AND RESEARCH IN BRAZIL

1- BUFFALO PRODUCTION

In Brazil, water buffalo were introduced in 1895 from Italy. The importations, because of little knowledge of the species, were sparse, in small lots and only continued until 1962. From then on, the importations from Africa and Asia were forbidden because of disease problems.

The extraordinary increase in the water buffalo population in Brazil, which is estimated at around 10 percent annually, represents approximately five times the bovine is in that country. The bubaline population is already over 400,000 head. Of the Brazilian herd of buffalos, about 300,000 head are located in the Amazon region.

The national herd of buffalo, however, is still small in comparison with the more than 90,000,000 bovines which exist in Brazil. The relatively small number of buffalo may constitute the principal problem in the development of buffalo research, extension and production in Brazil, especially considering that it is forbidden to import the animals from Africa and Asia, with the latter owning over 95 percent of the world buffalo population.

The buffalo in Brazil shows exceptional characteristics of milk and meat production, as well as good capacity for work, with high adaptability to environmental conditions, particularly in the Amazon region. The buffalo is, therefore, an animal of great importance to national animal production. This relation is more important in the Amazon region, which comprises 59.2 percent of the country and is underutilized.

The primary purpose of buffalo raising is meat. Secondary is the utilization of milk principally for cheese in the best season of the year. Water buffalo are also used for draft, notably for pulling ox carts, only occasionally as a saddle animal, for pulling of small river boats and transportation of wood logs and agricultural implements in soil preparation and seeding.

In Brazil, there are four breeds officially recognized; Mediterranean, Carabao, Jafarabadi and Murrah; the last one introduced as recently as 1962. The predominant breed is the Mediterranean, which has aptness for meat and milk production. The Carabao is used for meat and work, not having much milk ability. The Jafarabadi presents milk and meat characteristics, while Murrah shows excellent potential for milk and meat.

The predominant raising system is the extensive one, on native pastures, located essentially in inundated areas. On the flood-affected fields, a considerable variety of species of grasses such as Echinochloa polystachya, Brachiaria mutica, Leersia hexandra and Paspalum fasciculatum are found. Buffalo also consume, principally in the flood season, native pasture of inferior quality, located in the higher parts, formed by grasses of genera Paspalum, besides a great variety of species of the Ciperaceae family. The pastures normally do not possess cross fences, but in many cases just the property fence.

Cultivated pastures are still very little used, but presently are in a phase of expansion. In highlands the grass almost exclusively planted is Brachiaria humidicola and in lowlands Echinochloa pyramidalis and Echinochloa polystachya.

Mineral supplement is little used and when utilized, consists of the administration of mixtures that normally do not meet mineral requirements.

In every farm of buffalo there exists at least a corral for animal management. Other construction normally found is a

building for protection of calving cows, their calves and for animals in recovery. These buildings also serve to get milk from cows for families located in the farm and for cheese making. A milking unit only exists in a small number of properties specialized in milk production.

Natural sources of water are normally utilized for supplying buffalo or dams are constructed. In the inundated period, in the lower areas, elevated corrals are used for protecting animals against the flood and for feeding them with cut Echinochloa polystachya.

Rarely are the animals separated by category due to the almost non-existence of cross fences. The management of animals for reproduction consists of the use of bulls from 2.5 years old on with reproductive females, in a relation of one male for thirty females leaving the bull during the whole year in the herd. Generally the heifers become pregnant around 2.5 years old, with almost all calvings in the herd, appearing in a specific period of the year.

After birth, the calves seldom have their navels treated. Dehorning when it occurs, generally is done in the second week of life and consists in the cutting of the very small horns with a knife, followed by cauterization with a hot iron. Weaning is natural and occurs at around 10 months of age, when the animals are marked for castration, an operation little used.

Males are sold for slaughter at around 2 years of age, when they start mating, or are castrated, at the weaning time, staying in the herd up to approximately 2.5 years old.

Hot branding is the practice used, but with unsatisfactory results due to the relatively fast disappearance of brands, thus making raisers rebrand the animals periodically. Recently ranchers have started using tattooing in the ears with good results.

The most common disease problem in bubalines is worms, principally Strongyloides papillosus, Neoascaris vitulorum and Trichostrongylidae, which produce serious damage in calves. On the other hand, foot and mouth disease is a serious disease of buffalo. Besides that, brucellosis is another disease that produces damage to the herd. In farms located in highland areas, with a lack of water and mud for baths and wallowing, the mites Sarcoptes scabiei and Psoroptica equi variety bovis, and the louse Hematopinus tuberculatus cause problems.

Vaccination against foot and mouth disease is frequently used, twice a year in animals more than 4 months old, but vaccination against other diseases is seldom used. The application of vermicides is relatively frequent and consists in general of the use of vermicides based on levamisole and tetramizole.

In spite of buffalo raising in Brazil not presenting, generally, an elevated level of technology, the productivity indexes for buffalo are superior to those for bovines. These indexes are based on data of native pasture in the Amazon Region and are presented below:

INDEX	BUBALINE	BOVINE
Carrying capacity of native pasture	1 A.U.(450-500 kg)/ 3.5-4.0 ha/year	1 A.U.(300-350 kg)/ 2.5-3.0 ha/year
Calving percentage	60 - 70	40 - 50
Calf mortality	5 - 6%	10 - 11%
Mortality from 1-2 years old	3 - 4%	6 - 7%
Adult mortality	1 - 2%	2 - 3%
Culling	6%	9%
Slaughter age	2 - 3 years	3.5 - 5.0 years
Slaughter weight	300 - 400 kg	300 - 350 kg
Milking production per lactation (including cultivated pasture)	1,000 - 1,400 kg	800 - 1,200 kg

On the other hand, 8 kg of bubaline milk produces 1 kg of cheese while bovine milk requires 12 kg. Fourteen kg of bubaline milk produces 1 kg of butter, while utilizing bovine milk, 20 kg is required.

It is necessary to point out, however, that some buffalo raising farms show productivity indexes well above those presented; the result of adequate use of the technology generated principally by the Brazilian Corporation of Agriculture Research (EMBRAPA), belonging to the government.

2- BUFFALO RESEARCH

As to buffalo research, EMBRAPA is very interested in this research and is giving all possible support. In 1974, EMBRAPA established a Buffalo Research Unit, in the city of Belém, with the purpose of developing research initially for the Northern Region. This unit, in addition to the research area located in Belém, has one on the Island of Marajó and one in the Low Amazon Zone. These last two areas cover the two biggest principal areas of buffalo production in the country.

In 1976, EMBRAPA created the Agriculture Research Center for Humid Tropics (CPATU). From that time on, all regional research with buffalo came under the aegis of CPATU.

In addition to EMBRAPA's effort, in the Southeast, the Zootechnic Institute of the Government of São Paulo State and the Faculty of Medical and Biological Sciences of Botucatu, also in São Paulo, which is part of the Ministry of Education and Culture, have contributed to the development of buffalo research in Brazil. EMBRAPA is also to help these two institutions in buffalo research, mainly with financial support.

EMBRAPA intends gradually to strengthen the buffalo research developed in CPATU with facilities and especially with personnel, in order to coordinate in cooperation with the Beer

Cattle and Dairy Cattle National Research Centers, State Agricultural Research Units, located in different regions of the country, development of buffalo research. One of the major problems that EMBRAPA is encountering in reaching this goal is the small number of buffalo specialists that exist in Brazil.

2.1- EMBRAPA PROGRAM FOR BUFFALO RESEARCH

The provisional program established by EMBRAPA on buffalo is gradually being implanted, and is based on the need for better exploitation of buffalo. This program is summarized below according to research areas and specific lines. It is necessary to say that the basic research model established reflects the philosophy of concentrated work on the particular product (buffalo), through a multidisciplinary research team, focused on production systems.

1. Systems of meat and milk production

- 1.1. Physical and economic evaluation of high - and low - land systems individually and in combination

2. Feeding

- 2.1. Agronomical and nutritive evaluation of native and introduced forages
- 2.2. Studies on pasture establishment and fertilization, association of grass and legume and control of weeds in pastures
- 2.3. Management improvement of pastures through more adequate systems of grazing
- 2.4. Studies of mineral deficiencies and supplements
- 2.5. Development of feeding systems for the critical periods of forage production

2.6. Particularly for milk buffalo, studies on feed supplements for lactating cows

3. Management

3.1. Methods of maintaining buffalo in fences

3.2. Methods of buffalo identification

3.3. Methods of management for production and reproduction

3.4. Methods of buffalo utilization for work

4. Health

4.1. Determination of the agents and causes that affect animal health

4.2. Protection and control of infecto-contagious, parasitic and metabolic diseases

5. Genetic improvement

5.1. Systems of selection and mating for milk herds

5.2. Systems of selection and mating for meat herds

6. Technology of products and by-products

6.1. Evaluation of chemical, physical and biological characteristics of milk, its processing and industrialization

6.2. Evaluation of carcass and the chemical, physical and biological characteristics of meat, its processing and industrialization

6.3. Evaluation of the utilization of the by-products of slaughtering and feces

7. Commercialization

7.1. Commercialization of products and by-products of buffalo

2.2- PRINCIPAL RESULTS OF RESEARCH ON BUFFALO BY EMBRAPA

2.2.1- General Plan

Results of research show that Echinochloa pyramidalis is an excellent grass for cultivated pasture in inundated areas and for feeding buffaloes. Besides that, Echinochloa polystachya and Panicum chloroticum are promising grasses for pasture in flooding areas. In highland areas, Brachiaria humidicola, selected by research, is a very good alternative for cultivated pasture.

To solve problems of keeping buffalo within fences, a special suspension fence, highly efficient and economical, was devised.

Efficient dehorning was obtained using a hot iron on animals from three to eight days old. Also, dehorning with surgery saws or dehorning pliers, when the animals are about three months of age give good results.

Cryogenic branding for identification showed that the contact time to get 100 percent legible brands on the hip was sixty seconds; this method uses copper branding irons and a mixture of dry ice and ethyl alcohol. Other results of research in methods of identification reveal that the adequate use of tattooing in the ventral part of the ear showed 100 percent legible brands.

Data collected on fertility in bubalines on pasture of

Echinochloa pyramidalis showed calving percentage mean of 85.6 with the first calving at three years and three months and a calving interval of 410 days. This really represents an extraordinary reproductive performance, quite superior to the national mean.

Results of research show that the important worms can be efficiently controlled by oral vermicides, based on thiabendazole used in the first months of life.

2.2.2- Meat Production

Results of daily weight gain of weaned buffalo on Echinochloa pyramidalis with continuous grazing and mineral supplement showed that the Murrah type has a better performance than the Mediterranean, with approximately 800 g in daily weight gain per animal, using 1.5 head/ha. This permits the conclusion that bubaline can reach 450 kg of live weight at about 1.5 years of age on pasture.

Two year old Zebu and Bubaline steers, which came from native pastures, fattened for one year on cultivated pasture of Echinochloa pyramidalis and with mineral supplementation, in rotational grazing, presented means of final weight, respectively, of 301 and 484 kg. These bovines and bubalines were slaughtered and presented, respectively, 56.6 and 55.5 for dressing percentages and the following average weights in kilograms: Head, 10.8 and 18.0; skin, 24.2 and 55.1; shanks, 6.6 and 9.0; horns, 0.7 and 3.3; tongue, 2.0 and 2.2; lungs, 2.6 and 3.8; heart, 1.6 and 2.5; liver 4.0 and 6.5; kidneys, 1.3 and 1.7; clean stomach, 6.8 and 9.7; and diaphragm, 2.0 and 2.4.

On native pasture in continuous grazing with mineral supplementation, the superiority of Mediterranean, Carabao and Jafarabadi over Zebu and combined Zebu-Charolais was revealed in means of live weight at 2 years of age: 369 kg for Mediterranean, 323 for Carabao, 308 for Jafarabadi, 265 for Zebu and 282 for combined Zebu-Charolais.

2.2.3- Milk Production

Milk production in buffalo cows on pastures exclusively cultivated in Echinochloa pyramidalis is still more economical than that with concentrate supplementation, although the latter addition shows increases of up to 11 percent in milk production.

In Brazil
Data on milk production of selected buffalo cows, milked twice a day, maintained on pasture of Echinochloa pyramidalis and supplemented with a mixture of wheat bran and minerals, showed 2,328 kg of milk per lactation for Mediterranean and 2,640 kg for crossbred Murrah - Mediterranean. These results are far superior to the national mean and indicate that the crossbreeding of Murrah and the Mediterranean herd, predominant in Brazil, increases milk production considerably. In addition, these data show notable superiority of the Murrah - Mediterranean when compared with the data on selected crossbred bovines, Jersey-Red Sindhi and pure Sindhi, obtained by research in Brazil, which revealed, respectively, means of 1,991 and 1,636 kg.^x

Data on milk composition of Mediterranean bubaline and Red Sindhi Zebu females show, respectively, the following percentages: water, 83.63 and 88.40; dry matter, 16.37 and 11.60; fat, 7.90 and 4.19; non-fat solids, 8.47 and 7.41; casein, 3.59 and 2.43; lactose, 3.60 and 3.61; mineral matter, 0.81 and 0.70; calcium, 0.27 and 0.17; phosphorus, 0.28 and 0.19. The values for density and Dornic acidity are, respectively, for bubalines and bovines, 1.0342 and 1.0324; and 16.26 and 16.48. These results show the higher nutritive value of buffalo cow milk. ✓

3- CONCLUSIONS

By its extraordinary characteristics of milk, meat and work, together with its high adaptability to the Brazilian environmental conditions, especially those occurring in the Amazon region, water buffalo present great possibilities for

Brazilian livestock.

In Brazil, bubalines show productivity indices superior to bovines. The technological level in the bubaline sector of production still is not elevated although it is showing progressive improvement with the adoption of technology already available and generated principally by EMBRAPA.

Brazilian herds of buffalo, estimated at over 400,000 head are still much smaller in relation to the national bovine herd, which is estimated at over 90,000,000 head. This is the result of relatively recent introduction of buffalo in Brazil, of little knowledge on the species until 20 years ago and of the prohibition against importating buffalo from Africa and Asia, with the latter owning over 95 percent of the world buffalo population.

