



# Brazil

## Vanice Waldige

Business Development Manager – Feed, Agribands  
Purina do Brasil

vanicew@agribands.com.br

## Alexandra Caseiro

Aquaculture Products Manager, Nutron Alimentos  
Ltda

acaseiro@nutron.com.br

## Aquaculture in Brazil

Brazil has the climate, water resources and soil conditions exceptionally favorable to the development of aquaculture. The country has a long coastline of 8500 km, most of it suitable for the production of shrimp and other marine species. It also has 12% of the total fresh water resources on the earth and more than 2 million hectares of flooded lands. Yet aquaculture development in Brazil is relatively recent and has not fully reached its great potential.

Fish farming has been practiced in Brazil since the 1940s. However, scientific, modern Brazilian aquaculture dates from the 1980s, when the technology of artificial reproduction for native fish species was developed, exotic species such as tilapia, carps and catfishes were introduced and feeding with pelleted feeds started. In 1992, extrusion was introduced in fish feed manufacturing. Significant improvements in production followed. Fish yields in ponds that were usually 3000 kg/ha/crop using pelleted and supplementary feeds, increased to 4000-40,000 kg/ha/crop after the introduction of extruded and nutritionally complete fish feeds. The new feeds enabled the development of intensive fish culture systems, namely cages, raceways and recirculation systems where such high yield levels are possible. The main fish species is tilapia. Other major cultivated species are catfish, trout and the Amazonian native species such as the pacu, tambaqui (*Colossoma*) and pintado.



1. Ms. Vanice Waldige received her Animal Science degree from UNESP University in Jaboticabal/SP and MBA in Marketing from Getúlio Vargas Foundation. She has been with Agribands Purina Brazil since 1996 and is currently its Business Development Manager for feeds. She is the coordinator the Brazilian Feed Industry Association (ANFAL)'s aquaculture program.

2. Ms. Alexandra Caseiro has an undergraduate degree in Agronomy and a Master degree in Fish Production from the Sao Paulo University. She has been the Aquaculture Products Manager of Nutron Alimentos Ltda for the past five years. She serves as the Vice-Coordinator of ANFAL Aqua.



Commercial shrimp farming in Brazil dates from the introduction of the Pacific white shrimp, *Litopenaeus vannamei* in 1995-96. In 2002, average shrimp productivity in Brazil was estimated to be 5548 kg/ha/year, the highest in the world. The animals are raised in intensive pond systems that are stocked with 30-50 post-larvae/m<sup>2</sup>, fed complete feeds and mechanically aerated.

## Feed Industry

Brazil is currently the third largest feed producer in the world, after USA and China. In 2003, the country produced 40.8 million metric tons (MMT) of feeds valued at US\$ 7 billion. The feed production slightly declined by 1.9% in 2003 compared to the previous year. However, optimistic forecasts have been made for 2004 based on three factors: (1) increase in the domestic consumption of animal protein; (2) increased animal production due to increasing flock sizes; and (3) internationally growing demand for animal protein originating from Brazil (bovine, swine, broiler, fish and shrimps). The Brazilian Feed Association, ANFAL, has predicted that the feed production will increase by 4.5% in 2004.

The aqua feed segment produced about 263,000 MT in 2003, representing 0.6% of the total feed production (Figure 1). In 2004, it is expected to grow to be 0.71% of the total feed production. Obviously, the aqua feed industry is still a small segment within the overall feed industry. However, the growth potential of this segment is very high. In 2004, the segment is predicted to grow to 304,000 tons, a growth of 15.5%. This rate of growth is a lot above the expected growth rates for broiler (5%), swine (3%), beef (5.2%) and pet food (4.2%).

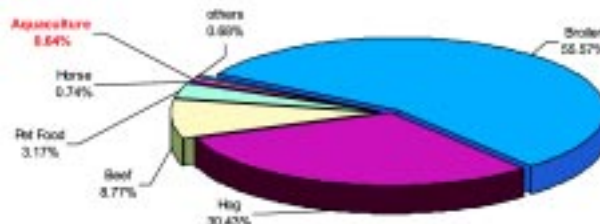


Fig1. Sales volume (%) of feed in Brazil in 2003

## The Aqua Feed Industry

There are about 40 companies producing fish feed and 17 producing shrimp feed in Brazil. Many companies are involved in other segments of the feed business. Table 1 presents feed sales volume of segments within the aqua feed industry. Feeds for the warmwater, omnivorous fish constituted the largest segment of the Brazilian aqua feed industry until 2002 (Figure 2). Shrimp feed segment is the largest at present due to the rapid growth of shrimp farming. Brazilian shrimp farming industry is actively growing in terms of cultivation area, number of hatcheries, farms and processing centers, and productivity. The feed segment grew by 81% in 2003 and is expected to grow by 24% in 2004.

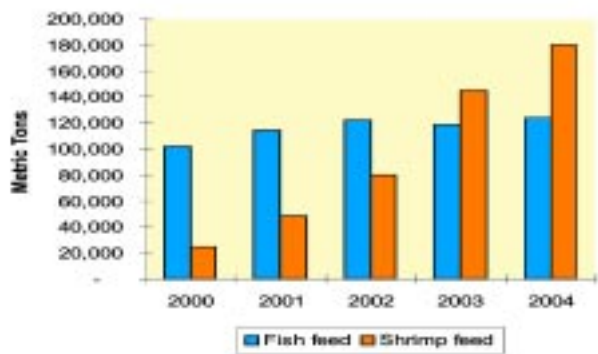


Fig 2. Trend in the growth of fish feed and shrimp feed segments

Table 1. Feed sales volume (in metric tons) for the various segments of the aqua feed industry in Brazil (2000-2004)

Segment	2000	2001	2002	2003	2004*
Warmwater, omnivorous fish	93,800	106,000	112,800	110,700	116,000
Coldwater, carnivorous fish	8000	8000	9500	7300	8000
Shrimp	25,000	48,000	80,000	145,000	180,000
Total	26,800	162,000	202,300	263,000	304,000

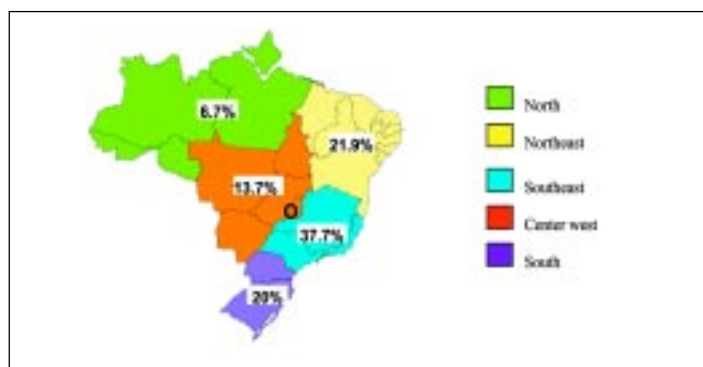


Fig 3. Geographic distribution of fish feed sales in Brazil in 2003. The total sales volume was 118,000 MT (Source ANFAL).

Figure 3 shows the geographic distribution of fish feed sales in Brazil. Most feed for fish are sold in the Northeast, Southeast and South. Even though temperatures get low in southern Brazil, almost 50% of the fish production occurs in this region. The reason is that this region has many traditional, family-owned broiler and hog farms and fish farming is a complementary activity. The North and Central West regions are very rich in natural resources including natural fisheries. Since the hydroclimatic conditions are favorable, fish farming is also expanding rapidly in this region. The Northeast and Southeast have seen an expansion in large, intensive fish farming projects such as cages in the reservoirs of hydroelectric power stations or large lakes. Many companies are setting up operations in this region to produce, process and export tilapia.

Figure 4 shows the geographic distribution of shrimp feed sales in Brazil. A vast majority of shrimp feed is sold in the north eastern region of Brazil where warm climate, availability of clean, salt water and vast expanse of undeveloped land area, is conducive to year-round shrimp farming.

Fish feeds sold in Brazil are formulated based on whether the target species is an omnivore or a carnivore. Typically, feeds for various stages of fish growth are offered. Particle sizes ranging from fine powder (<1mm in diameter) for fry to as large as 15 mm (for the final grow-out stage of the "pintados") are

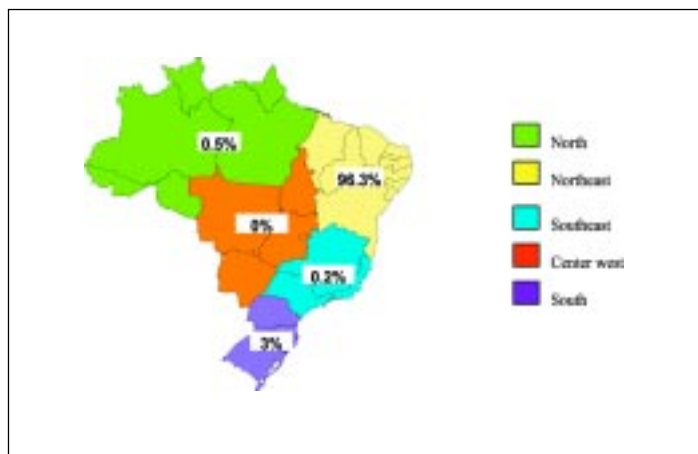


Fig 4. Geographic distribution of shrimp feed sales in Brazil in 2003. The total sales volume was 145,000 MT (Source ANFAL).

offered. The feeds are mostly extruded with levels of crude protein that vary from 22% to 56%. A wide variety of feeds for the larval shrimp in liquid or dry form are sold in Brazil. Crumbled feeds are offered for the post-larval phase. Pelleted or extruded feeds are offered for the grow-out phase. The product formulation is mainly differentiated based on stocking density. Feeds containing 30% crude protein are offered for stocking densities < 30 shrimps per m<sup>2</sup> while feeds with 35% crude protein are for stocking densities >30 shrimps per m<sup>2</sup>.

## Feed Ingredients

Brazil has adequate, year-long supply of feed-grade grains and agricultural by-products that are raw materials to the animal feed industry. Brazilian raw materials used in aqua feed formulations are soybean meal and soy oil, corn grain, corn gluten meal, low tannin sorghum, wheat and its byproducts, cottonseed meal, poultry by-product meal, meat meal, meat and bone meal, 55-65% protein fish meal, brewers' and distillers' by-products and vitamins and minerals.

High variation and a generally increasing trend in prices of aquafeed ingredients were observed in 2003. Many major commodities showed high volatility due to the reduction in world stocks of the raw materials. The prices of soybean meal, corn grain, wheat middlings and poultry by-products meal increased by 16%, 5.9%, 19.5% and 18.9%, respectively. This resulted in an increase of 6 to 15% in the costs of fish feed formulas (Table 2).

Table 2. The impact of raw material on fish feed formulas considering costs of ingredients in December 2003.

Raw material	Contribution in the cost of formulation (%)	
	Carnivorous fish feed	Omnivorous fish feed
Soybean and by-products	22.5%	15.1%
Soybean meal replacers	33.8%	32.4%
Corn and by-products	6.6%	20.5%
Wheat products	10.6%	26.5%

## Fishmeal:

Two kinds of fishmeal are widely used in the Brazilian aqua feed industry: (1) high quality, prime or super prime grade fishmeal imported from Chile or Peru; and (2) local fishmeal (crude protein, 50-55%) produced from fish processing wastes. The former is used in the manufacture of shrimp feeds and carnivorous fish feeds, while the latter is used in the manufacture of omnivorous fish feed and low cost shrimp feeds. The cost of local fishmeal increased by 38% in 2003 compared to the previous

year (Figure 5). This is because of lower wild fish supplies. It is estimated that the price may increase by another 5% in 2004. Imported fish meal price increase was by less than 4%; the average price estimate was US\$ 738/MT. The prices may increase further until Peru's fishing season opens in March or April.

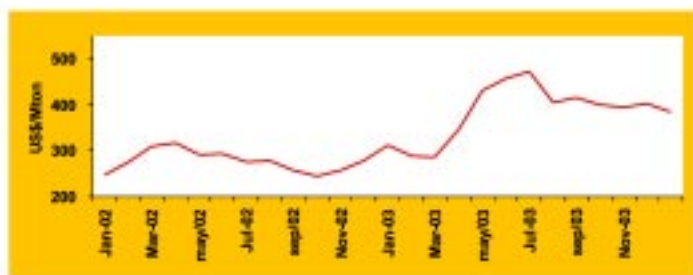


Fig 5. Average price of Brazilian fishmeal during 2002-2003

## Soybean and by-products:

Although Brazil is self-sufficient in soybean production, the local prices fluctuate based on the international prices. As shown by Figure 6, the prices of soybean complex increased in 2003 when compared to 2002. This is attributed to the loss of crops in the USA due to high temperatures and draught. The predictions for the next soybean crop indicate a further reduction in the world production and an increased demand that will increase the prices, although an increased production of Brazilian soybean is expected to off-set some of the price increase. Brazilian Mercantile & Futures Exchange (BM&F) settled down sales contracts for soybean at US\$ 282/MT for March 2004 and at US\$265/MT for April 2004. These represent an increase by 8.8% and 2.3% of January 2004 prices.

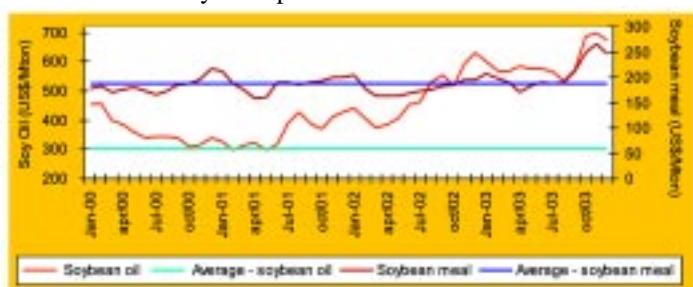


Fig 6. Average prices of soybean meal and soy oil in Sao Paulo, Brazil (2000-2003)

## Corn:

Brazil reached a record production of corn grain in the 2002/2003 crop. The volume produced during the summer and winter crops, met the local demand of 37 MMT and allowed the exportation of 4.2 MMT. The local corn prices are related to the international prices, which showed only a small variation in 2003.

While the summer crop of 2003/2004 has yielded about 27 MMT, the winter crop will be fundamental in supplying the local demand. The higher attractiveness of soybean compared to corn, has forced the farmers to plant corn more during the winter season, increasing the risk of crop losses. Production and utilization of corn in the US will also determine the future prices. BM&F has settled down sales contracts at US\$ 114/MT for March 2004 and at US\$ 112/MT for May 2004.

## Wheat:

Brazil imported almost 50% of its wheat grain demand in 2003, mainly from Argentina. Wheat and its byproduct prices

have increased since mid-2002. In the 2003/2004, Brazil will likely maintain the same levels of production obtained in the last crop. While Argentina may increase its production by 9%, the US wheat stocks will probably decline to 23%. This reduction is expected to cause increases in the price of wheat products in the international market.

## Aqua Feed Pricing

The following costs are considered in pricing feeds: (1) formula cost; (2) manufacturing cost; (3) quality assurance cost; (4) costs of administrative and support departments, and (5) taxes. (9.63-14.68%) Formula cost represents 55-65% of the feed cost and is influenced by the variation in raw material prices of raw materials. Manufacturing accounts for 10 to 18% for extruded feeds and 5 to 8% for pelleted feeds. The percentage of other costs will be a function of costs of each company.

## Issues to be Addressed

Fish farming in Brazil is still dependent on domestic markets and free fishing. Brazilian fish farmers need to increase their production, scale up their efficiencies, offer quantity and regularity in their supplies and access the international market. Infrastructure to process and export fish should also be developed. Tilapia will become the most important species for the export market.

In shrimp production, Brazil's major issue is that its exporters are facing more and more market restrictions for the shrimp type produced in Brazil. The antidumping lawsuit in the US also poses a threat to Brazil's shrimp as it would unfairly increase the cost of shrimp procured from the country. Producing a brand-image for Brazilian origin shrimp and value-addition in processing will be two key elements to help the shrimp farming industry in the future. Difficulties and deficiencies of public mechanisms of environmental licensing need also be addressed to enable sustainable development of the industry.

For sustainable development of aquaculture in the future, the feed industry should use more vegetable proteins and try to reduce nutrients losses before feeds are ingested. A major step will be to know how to effectively use synthetic amino acids to balance the diets and to use enzyme or feed processing technology to reduce anti nutritional factors present in the vegetable proteins. To reduce nutrient loss before ingestion, attractants that increase the palatability of the feed should be considered. Technologies like encapsulation to prevent the pre-ingestion loss of soluble nutrients such as amino acids and vitamins, minerals must also be developed. The industry also needs better knowledge of immunostimulants and other means to increase resistance to diseases and the use of pigments to serve markets that demand high level of pigmentation in shrimp. Complying increasing demand for quality traceability and food safety partly depends on the feed manufacturers. Understanding the composition, origin and supply chain history of ingredients will be critical in ensuring food safety. It is only logical that Brazilian feed manufacturers will be asked to play a role in working with farmers, processors and the rest of the entire seafood supply chain to ensure that shrimp and fish for human consumption meets high standards of quality and safety.