



Tannery of the Year: Couro do Norte, Belém, Pará, Brazil

Located in the northern Brazilian state of Pará, Couro do Norte grew out of a family-run wet-salted hides business. Around 15 years ago it began adding extra value to local hides by turning them into wet blue and wet white and has now built up a successful beamhouse operation with clients in Asia and Europe as well as in the Americas.

The Barbosa family has been involved in the hide business for generations, starting off as wet-salted hide traders in the state of Ceará. A representative of the third generation of the family to live and breathe the business, Marcelo Barbosa moved north in 1981 to set up a new branch of the company, Couro do Norte, in Belém. He still works there today as chief executive, with his sons Fábio, who is managing director, and Leandro, who is human resources and production director. His wife, Maria, also works at the tannery managing finances and a third son, also called Marcelo, is currently running a spin-off company that produces dog-chew products although most of his activity is 600 kilometres away in the city of Imperatriz in the neighbouring state of Maranhão. "It's a great

thing to work together as a family," the company's founder says. "It allows us to have complete trust in one another and I'm very proud to have everyone working together. It gives me a real sense of triumph."

Couro do Norte is a tannery that produces wet blue and wet white from the high-quality bovine hides that livestock farmers in the state of Pará have long been famous for producing. It was the attraction of this high-quality raw material that brought Marcelo Barbosa to Belém in the first place. Around 60% of the hides that come into the Couro do Norte beamhouse are from bulls, between 30% and 35% from cows and the rest from buffalo, local buffalo. Respectively, these yield averages of 48-58, 40-46 and 44-48 square-feet per hide.



Where the buffalo roam

This probably requires explanation. Belém is about 150 kilometres from the Atlantic Ocean, but is a port city and seems to have water on all sides. This is because it's at the confluence of two rivers that meet in the Baía de Guajará. South of the mouth of the Amazon itself (with the biggest river island in the world, Marajó, in the way), the bay is connected to the complex system of rivers that form the Amazon estuary. Marajó is where the water-loving buffalo roam; the island, which is roughly the size of Switzerland, has a herd of almost half a million head and a thriving buffalo meat and cheese industry and the hides are in demand too.

Green logistics

Like the buffalo, the cattle hides Couro do Norte buys are all from the north of Brazil, mostly from the state of Pará. "Pará is a big place," managing director, Fábio Barbosa explains. "We have a regular delivery from Santarém, for example, that takes three days to reach us because it comes by boat along the Amazon, which we think is a fantastic way to run this part of our logistics operation." The way it usually works is for a logistics company to drive a truck full of hides onto a ship and entrust the keys to the shipping company. When it docks in Belém, the logistics company has a new driver collect the keys and complete the delivery by road. When Fábio Barbosa sources in other states, the distances and times involved mean he feels it best still to limit himself to the north of Brazil, not least because it would be expensive to bring hides in cold storage from, say, Mato Grosso do Sul, 3,000 kilometres away, tempting though it may be at one level at a time when slaughter rates are lower than they have been in recent years and processing levels at the tannery are around 2,000 hides each day, which is 80% of full capacity. This isn't the packers' fault, he says quickly. His company's relationships with its hide suppliers are strong. Packers that Couro do Norte worked with at the time of its launch are still among its regular suppliers and even the newest of all its hide suppliers has been a source of raw material for at least five years. "We still have to have discussions about prices every week, of course" he says.

Instead, he offers the current general economic situation in Brazil as the reason for the downturn in raw material volumes. "The



Sets of these rack mounted and colour-coded recycling containers are used extensively throughout the plant, before delivery of the waste to the final segregated area.

economy here is difficult at the moment," Mr Barbosa explains. "Unemployment has risen, while things like energy bills have risen sharply. The hoped-for economic benefits of the FIFA World Cup in 2014 have not materialised because the country spent so much on building new stadiums. Beef has become quite expensive for ordinary consumers, so demand is down and farmers are sending fewer cattle to slaughter, waiting in the hope of a rebound in demand and an increase in the prices they can secure from the packers." While he believes that 2016 (despite the Rio Olympic Games) may not be wonderful either for the Brazilian economy, he harbours hope that things may get back on track in 2017. In fact, he thinks Brazil has a lot to be optimistic about. "In the longer term, there are few places that can match the capacity we have in Brazil to raise cattle. The world needs food and somebody has to produce it," he says, "and that has to be good news for Brazilian leather. The signs are already showing that the automotive industry in particular is increasing its demand for leather, possibly by millions of square-feet per year. Who has the capacity to produce those millions of square-feet? Brazil. "If anyone can provide that material, it's us. We have the cattle, a herd size of more than 200 million in 2014, we have the slaughterhouses and tanneries, we have the know-how."

Understanding partners

For Fábio Barbosa, there are advantages to working with Brazilian machinery manufacturers: they understand the material Brazilian tanners have to work with and understand the legislative environment under which they have to operate. An interesting example is its fleshing machine, which is Brazilian-made. Two operators working side by side, placing hides into the machine, fleshing one end and then turning it to flesh the other. They work quickly and in unison, as skilled operatives of this kind do in tanneries all over the world. Here, however, both workers have to press two buttons each, with the buttons space too far apart for this to be possible without using two hands each, before the machine starts. All four buttons must be pressed at once, meaning all four hands have to be well clear of the machine before it starts. Mr Barbosa explains that this development came about as the result of a new norm, part of health and safety legislation in Brazil, which local machinery companies are well up on and can react to quickly. Something similar has happened with the Brazilian drums that Couro do Norte has in place. It will soon be a requirement for tanners to put extra protection in place at access areas to drums and at the axle and motor of each vessel. When Couro do Norte decided it wanted to be a quick mover rather than wait until the



From a technical point of view

(1) Overview of operations

Couro do Norte tannery and headquarters are located within the city of Belém, on a site extending to a branch within the Amazon estuary, where it has operated since 2000. Now, 170 people are employed on this site, all involved in the manufacture of leather to the wet blue state and dog chew products.

The tannery processes 2,000 hides per day, being a mix of bull and cow bovine and buffalo hides from accredited and traceable sources. The bovine:buffalo ratio is 90:10, tanned mainly to the wet blue state, although 15% of the bovine production is manufactured and sold as wet-white leather. In addition, there is a separate department where dog chew products are manufactured from flesh splits resulting from the lime splitting operation.

(2) Manufacture and processing

The salted bovine and buffalo hides are delivered daily to the tannery. The input weight for processing is a standard 16 tonnes, with the liming and tanning operations performed in a double row of wooden deep-shelf, slow-revolving drums. There are 12 in total, each being 4.0 metres diameter and 4.0 metres width, and all being served from a central overhead mezzanine. All of the water is measured into the drums using calibrated water feed containers, and calibrated measures placed on each drum to establish accurate float levels.

The hides are first desalted in a slatted tumble drum, then wet back using a wooden through-feed wetting back drum fitted internally with helically arranged shelves and pegs. This operation takes 45 minutes with the hides being deposited next to a line-conveyor so that the hides can be readily hooked onto the line for delivery to an elevated Bremm Peck Maxxi whole hide fleshing machine for green fleshing.

The machine layout is such that as the fleshed hides drop via a chute to floor level they can be hooked onto a second line conveyor for delivery to a designated drum. Here they



Salted hides together with water are moved through this wetting back drum on rotation to rehydrate the hides in preparation for the green fleshing operation.



Within the fleshing operations, as part of operative safety, both operatives need to place and retain both of their hands on pressure pads set on machine (as shown) during the machine closure phase.



To better the operatives' grip on the hides on presentation to lime splitting, a mix of lime and detergent is applied to their gloves instead of sawdust thus avoiding the contamination of the flesh splits within other areas.



The guarding of the processing drums is extensive. Guarding of the front, rear and mezzanine service area has been extended to cover the sides of each vessel, the axles, motors and gearboxes, and belt and cog drives.



are automatically detached from the conveyor to drop into the open drum door. After a hair saving liming process, the hides are dropped onto the floor, then hooked onto a third line-conveyor for delivery to the lime fleshing operation.

This machine is elevated for feed to lime trimming, then direct offer to the whole hide lime splitting operation. After splitting to substance the hides are transported by line-conveyor to the selected tanning drum.

All of the limed splits are separated at this stage for either dog-chew manufacture or together with limed trimmings for sale for gelatine manufacture. A mix of lime and detergent is used to improve grip for hide manipulation at this stage as an alternative to sawdust to avoid contamination of the limed splits in their further processing stages.

After tanning, the hides are dropped from the tanning drum to the floor, then hooked onto a final line conveyor for delivery to the through-feed samming operation at a rate of six hides per minute. Outfeed is onto a conveyor for area measurement, followed directly by quality assessment and grading that is assessed from a bridge mounted across the conveyor. Finally, the hides are stacked and sealed in polythene prior to customer dispatch.

DOG CHEW MANUFACTURE

Lime splits are delimed and bleached in a drum in a separate department. After dropping the goods from the drum, they are then squeezed to a uniform moisture content using a through-feed wringing machine, stacked into uniform parcels of pieces, then cut using a band saw into pieces of appropriate size and length. These pieces are then either dried as squares, or hand rolled to a specific diameter, length and weight. The weight and volume of each piece is made uniform by incorporating off-cuts within the rolling operation. These rolls are placed on drying racks, then oven dried for between four and seven days until completely dried out and bone hard. After inspection and trimming as required, they are packaged for dispatch.



Hides are carefully stacked after grading, then sealed in polythene before dispatch.



After dumping the hides beneath the tanning drums after chrome tanning, they are hooked onto a line-conveyor for direct feed to the samming operation.



Each hide is assessed for quality and graded from a bridge set across the outfeed conveyor of the samming machine.



Dog chew products are manufactured on site. Photograph shows limed splits that have been bleached and delimed, are then cut to size and hand-rolled before drying.



RECYCLING WATER AND USED FLOATS

There are three major areas of recycling practised:

- In the soaking operation, the hides are fed into the open end of the rotating wetting back drum together with the water delivery. The hides feed out of the opposite drum end and together with the washing water drop onto a grid set over a container to retain the drainings. This separated water is then recycled to the feed end for recirculation. Fresh water is also required, but the volume is reduced by this technique. The system is emptied at the end of each day to avoid excessive build-up of salinity in the system.
- All of the used lime liquors from the hair recovery process are segregated on discharge, screened and settled in a series of sumps. In the hair-saving process, the unhairing and initial liming stages are first performed with fresh water at a low float. At a second stage, the supernatant from the settling sumps is added to increase the float volume. This saves fresh water and reduces the chemicals consumed.
- All of the used floats from the chrome tanning process are separated on discharge, then screened to remove fine solids on a wedge wire screen. The filtrate is delivered into a collection sump, then settled in a settling vessel fitted with a conical base. The chrome tannage operates by draining the float after the acid/salt pickle, then adding the calculated amount of chromium tanning product, but with the float made up with the recovered chrome-containing supernatant. This provides saving in both new chrome products and water.

SAFETY ISSUES

- Hides are delivered by truck into the hide reception area within the main tannery. A post has been erected in this area so that a taut cable runs from this point to the wall of the building. On delivery of a truck load of hides, the truck trailer is positioned so that this cable is set above the centre of the load. The workforce unloading the trucks have to attach themselves to this cable using sliding safety lines. This is to avoid injury that would occur if they fell from the truck-bed or load onto the tannery floor.
- The fleshing machines are fitted with an unusual safety device. This ensures that the machine will not close for the fleshing cycle unless both operatives have placed both of their hands and depressed two pairs of pressure pads.
- All of the processing drums are fitted with sliding guards with small gauge mesh that fully prevents any operative contact with the vessels when in motion. This guarding includes the sides of the drums, the axle, the drive motor, gearbox, belt and gear drive. If the guards are removed by any operative or maintenance engineer the system automatically shuts down.
- All of the chemicals are held in designated areas. In particular, all sodium sulfide is held in a separate room within the main building, with common access prevented by fully fitted steel doors that are locked. When these doors are opened air is automatically extracted from the room. In addition, hydrogen sulfide detectors are fitted in the plant, and these are set to detect at lower levels than required by legislation.



The used floats following chrome tannage are screened to remove solids on a wedge-wire screen. The filtered solution is then allowed to settle to remove residual fine suspended solids before reuse in subsequent tanning processes.



All of the fleshings are cooked in vitreous steel tanks to release fats and grease. This extract is decanted and stored in poly-crates before sale for soap and other products.

(3) Solids management

- Green and limed fleshings are steam heated to recover natural grease for external sales for soap and bio-fuel.
- Limed splits are used in a ratio of 70:30 for in-house dog-chew products manufacture and sales for gelatine production.
- Heads and raw off-cuts are unhaired and limed separately, then sent for gelatin manufacture.
- Residual solids following grease extraction, settled solids from recycling used liming floats, hair from the hair recovery process, wood ash from the steam generation plant and solids from effluent treatment are held separately. After removal from site, these solids are mixed with compost at the company's 2,000 hectare farm (that supports 2,500 cattle), then applied by manure spreader onto grassland as nutrient.
- Wooden pallets are repaired up to four times, and when no longer viable are used as fuel on the wood-burning steam generation plant.



After mixing for balancing, equalisation and aeration (left), the effluent is chemically dosed and settled in a row of four reaction and settling vessels operating in series. This is followed by biological treatment (right), then secondary clarification.



All of the solids from primary and secondary clarification are dewatered to approximately 25%. The centrifuge is mounted so that when the solids drop to the floor they can air-dry before being removed by bob-cat.

- Used plastic containers are cleaned and reused and sold.
- All in-house miscellaneous waste is segregated at source. All of the containers used are the same size, mounted at waist-height, and colour-coded. Waste is finally delivered and held in covered segregated areas prior to sale for reuse or recycling.

(4) Water and environmental management

[a] WATER

All of the water used within manufacture is provided by municipal supply, from rainwater collected from the roof area, and bore-hole extraction. After processing the effluent to standards as set by the municipality, the treated effluent is discharged into the local river, some 60km from the Atlantic Ocean.

[b] EFFLUENT TREATMENT

Approximately 180m³/day are treated over a seven-day week. All of the discharges from the tannery are screened, then collected in a single balancing and homogenisation sump where they are mixed and aerated using cavitation aeration. The effluent is then removed and dosed with aluminium salts and polyelectrolytes, followed by primary clarification in a series of four elevated settling tanks.

The supernatant from primary settling then undergoes conventional biological treatment with the air being provided by diffusers, followed by settling for secondary clarification. The effluent is discharged from site via a flume for volume measurement, and continuously sampled for analysis.

The treatment of the sludges produced from effluent treatment has recently changed from dewatering using a series of conventional evaporation and filter beds to dewatering by centrifuge. These beds are covered as the rainfall is heavy, took 14 days to dewater and required manual removal of the dry solids. The single elevated centrifuge, which runs for two hours each day, has the solids dropping into a covered area at a solids content of approximately 25%, and is then allowed to build up with further dewatering by evaporation.

[c] ENERGY

- All of the heat is provided by a wood-burning steam generating unit that consumes approximately 7m³ of wood per day. All of this wood is waste and unusable off-cuts from saw mills and other sources. This includes wooden pallets that are beyond repair.
- Other energy use is electrical, with low level diesel use, but no heavy oil or gas is used for energy. ☺

last minute, the machinery manufacturer that supplies its drums worked with it to cage off the potentially problematic areas. Mezzanine-level gates in the cages gives easy access to each drum, but if a gate is left open, the drum will stop turning.

Because many of the bovine hides the tannery processes are from the famous Zebu breed of cattle, there is the perennial problem of the hump to deal with. Mr Barbosa is in no doubt that Brazilian machinery manufacturers have been able to adapt their technology more successfully to this peculiarity than their rivals in other parts

of the world. For him, this shows itself most clearly when it comes to splitting: hides from the humped animals come out without the damage that conventional splitting machines often seem to cause.

The company has invested in Italian machinery, too, saying specifically that it likes the speed at which its Italian samming machine works and the extent to which it opens up the hides. On the chemical side, Couro do Norte's most successful collaboration so far has come from a project with one of the specialist international leather chemicals manufacturers. It's a

beamhouse system that uses enzyme technology to reduce by 67% the amount of sodium sulfide the tanner has to use.

Leather demand

These days, good suppliers of wet blue work in close co-operation with the customers who order their products and turn them into finished leather. The Barbosas know where their hides go and the market segments their customers are working in. Fábio Barbosa finds himself travelling very frequently, visiting these customers and discussing with them the way demand is



The area surrounding the factory is set with mature trees, but this is being supplemented with new trees and plants set in containers.



Sealed and palletted wet blue hides before dispatch.

moving. "We can look at automotive and furniture together on the one hand and at footwear and accessories together on the other," he says. "Automotive and furniture account for 70% of our shipments at the moment, and shoes and accessories for just over 25%, with wet white making up the rest. So far in 2015, 25.9% of our hides have gone to customers here in Brazil, followed closely by China with 24.8% and Portugal with 22%. We are seeing a lot of growth in automotive and some in furniture too. It's very clear to us that demand is strong among big automotive tanning groups

because they come to us every month to audit us. We offer traceability back to the slaughterhouse to all customers, but in addition, the automotive companies want details about chrome, about pH and a series of other details. We know they need us because a lot of them no longer run their own beamhouses, preferring just to buy what they need when they need it."

For clients in Japan, South Korea, Singapore and India as well as those in China, however, it would be hard to describe this as a just-in-time operation. The wet blue leaves the Belém tannery in containers for

the port of Vila do Conde around 100 kilometres away for loading onto ships and transporting up to the Panama Canal and across the Pacific. With this, and the bureaucracy surrounding the letter-of-credit system, it can easily take four weeks for Couro do Norte hides to reach Asian customers' facilities.

Mr Barbosa is certain leather content in athletic, casual and lower-priced shoes will continue to go down. "Away from the consumers who want to invest in top brands and high quality, it looks to me as though people don't mind wearing plastic or textiles on their feet instead," he comments.

He feels that if other industry bodies want to address this lack of appreciation for the uniqueness of leather, they should take a leaf out of CICB's book. This organisation, the main national tanning industry body in Brazil, does a good job of promoting leather and protecting the material's status. One initiative, called Lei do Couro, involves CICB moving around Brazil searching for examples of people misusing leather's name by applying it, often with the doubly misleading prefix 'eco-', to shoes, accessories and other goods that are made from synthetic substitutes for leather. "There is nothing 'eco' about these synthetic materials," the Couro do Norte managing director says. "It's plastic."

He would like to see greater collaboration with the meat industry in redressing unfair negative publicity that circulates about meat, leather and anything associated with raising livestock, especially in the Amazon regions of Brazil. An increase in slaughter levels is required, Mr Barbosa says, and for that to come about meat companies need to promote the positive aspects of their products so that tanners can do the same with leather. "We need each other because there is negative publicity everywhere," he continues, "but consumers are not receiving correct information. Leather is not a dirty industry today, it's a sustainable, high-tech industry. The petroleum industry on the other hand is a dirty industry. What would packers do with the hides they produce if there were no tanners? Sometimes you hear people say the material could all go to gelatin producers, but even if demand for gelatin were high enough to support that those companies will never be able to pay the price for hides that tanners can pay because they will never be able to add the value to hides that tanners can add."



An important part of the social life at Couro do Norte is a regular football tournament among teams made up of employees from different parts of the tannery.

He has views on the situation in the Amazon too. Farmers who came north to settle in this part of Brazil a few generations ago were initially told to clear the trees: the government wanted them to clear the land and use it to produce food. Then, after campaigns from non-government organisations at the end of the last decade, packers, tanners and brands came under severe pressure to stop sourcing meat, hides or leather that had links to farms found guilty of illegal deforestation. "It's gone way beyond that now," says Mr Barbosa. "Farmers are now being asked to reforest high proportions of their land, depending on exactly where it is. It's not uncommon now for farmers to have to devote 50% of their land to growing new trees, and it can take ten years to grow a tree here; if they fail to comply, no slaughterhouse will be permitted to take meat from that farm. The government passed a law in May 2012, which people can look up if they like (it's law number 12651) imposing on farmers reforestation measures to counteract the previous deforestation. It's the correct way; we think new trees are good, but the positive news never gets heard, just the bad news."

Deforestation of the Amazon is world news; reforestation of the Amazon makes no waves at all. The Barbosa family runs a farm of its own on 2,000 hectares of land outside Belém. It keeps 1,500 head of cattle there and, while able to try out ideas such as one to boost pasture growth using fertiliser that contains recovered hair from hides and

solid waste from the tannery, it is subject to the same challenges as those who farm fields all over the north and north-west of the country.

Life and work

In all, 170 people work at Couro do Norte and most live nearby, many within walking distance of their place of employment. At the end of the working day, groups of workers often stay behind and play on a good-size (if not full-size) football pitch close to the tannery entrance. The tannery runs its own football championships, with eight teams that combine people from all departments competing against one another. The tournaments take place twice a year. The football field is in a pleasant location, just behind a line of jambo trees that form an avenue of shade between the entrance and the tannery itself. A specialist supplier put a weigh-bridge in the middle of this tree-lined road in 2005. It suggested the football pitch would make a much more suitable location, but Couro do Norte said no. It then said placing it on the road would make cutting down the trees essential, but the company stood its ground on this too and the trees remain. As well as shade, the trees provide red, peach-like jambo fruits in August and September, which the workers are fond of collecting. There are also mango and coconut trees and, at the extremity of the tannery grounds, some eucalyptus to help keep the air sweet-smelling for the local community.

Food for the workers matters to Couro do Norte. It has a practice of paying a food grant to its employees on top of their salaries. Human resources director, Leandro Barbosa, explains that if the company were to increase salaries instead of offering a food grant as a supplement to workers' salaries, the tax burden would also increase, meaning the money would go less far for the employees. "Because we give it as a food grant, the tax stays the same," he explains.

There is a school across the road from the tannery that, like most, has pupils of all ability on its roll. When Couro do Norte learned that the school authorities had no budget for remedial learning provision, the company decided, without making any noise about it, to pay for the learning support teacher, and now pupils who need extra help with reading, writing and counting have a specialist on hand to help them through catch-up classes that take place every day.

In an equally quiet and unassuming way, Couro do Norte also supports a local refuge, set up specifically to help girls aged from 10-15 who are under threat from or already are victims of sexual abuse. Rather than money, the support the tannery gives to the refuge is in the form of food and personal hygiene products. Leandro Barbosa, who has been to visit the centre, says Couro do Norte has been able to use its contacts in the meat industry to buy a whole cow and to have all the meat from it go to feed the girls and the people who look after them for weeks. The shelter, called Raio de Luz (Ray of Light), was opened in 1996 and is run by a not-for-profit organisation called CVC, which stands for Centro de Valorização da Criança (Centre for Recognising the Value of Children).

Fábio Barbosa agrees with his father that having so many members of his family work together is a good thing, but points out that the members of his family "have a real feeling for what we are doing here" and are involved because they love the leather business. He says people are what matter most to him, inside and outside of the company. "It's not just about numbers," he says. "Companies are made by people. We are who we are because of the people who work here and because our family has been doing this for generations. It's in our blood." His father, Marcelo Barbosa, says the industry gives him great enjoyment and that if he were starting all over again and could choose any area of business to go into, the leather industry would still be the one he would pick. 🌐