Sea for yourself
Animal Welfare

TECHNICAL FACTS

TASSAL GROUP

As responsible farmers, we care about our livestock and our team is committed to strong animal welfare practices to ensure our salmon and prawns are properly housed, fed and protected from predators.

We have animal health management plans for all salmon and prawn farming operations which set out our expectations around animal health and welfare and our procedures for optimising outcomes on a farm-by-farm basis.

Our stock is checked and monitored daily for behaviour, appetite, and any abnormal signs, while a specialised animal health department carries out assessments and routine visits. We regularly carry out animal health and welfare risk assessments before major husbandry activities such as smolt transport to sea sites or post larval movement to our grow out farms.

Our animal health program and the changes we make to our farming processes to improve health and welfare are continually assessed by a range of monitoring systems and dashboards that highlight anything out of the ordinary in any pen or pond in real-time allowing for a rapid response.

We proactively conduct animal health and welfare audits and reviews of our processes. When we make broadscale changes to how we farm in order to improve animal health and welfare, we do this only when we have evidence that those changes will be beneficial. This is the principle of evidence-based health management, which we subscribe to.

Harvest	**Salmon**

Fish harvest protocols are overseen by our company veterinarian. Our fish are humanely harvested by percussive stun followed by bleeding on the harvest vessel. There is no transport of live fish to the processing plant.

We have operational procedures in place for crowding and slaughter during harvest to minimise stress and injuries to our stock.

Our harvest team are appropriately trained and have signed off on our harvest welfare guide. A person responsible for fish welfare is present throughout the entire harvest operation and fish behaviour is constantly monitored.

Harvest	**Prawns**

We make sure we harvest our prawns humanely, ensuring that stunning occurs quickly through chilling in an ice slurry as recommended by the RSPCA Australia.

Our prawn farmers complete training and sign off on procedures for all activities that may affect animal welfare.

Handling	**Salmon & Prawns**

We have strict animal handling protocols in place to ensure appropriate handling of animals by our employees. This includes a requirement for handling to only be carried out when absolutely necessary and to keep time out of water to a minimum. These protocols communicate to our employees the methods expected when holding animals and animal recovery following handling.

Sea for yourself
Antibiotics

TECHNICAL FACTS

TASSAL GROUP

As little as possible, as much as necessary.

Like any farmer, we need to look after the health and welfare of our stock. We maintain a strong focus on animal health and welfare, and antibiotics are used as required.

It is inhumane to not treat animals when they are sick, as such we treat them under the supervision of a vet and in line with strict animal health and welfare policies.

We have invested considerably in salmon vaccine development to enhance livestock welfare because we understand the benefits of vaccination. Our location informed approach ensures our livestock are prepared for the area where they will grow.

Antibiotic use is audited annually at each of our sites through our third-party sustainability certification audits and is only administered under the authorisation of a registered veterinarian.

The Aquaculture Stewardship Council (ASC) salmon standard includes strict requirements surrounding the use of therapeutants, including prevention of the use of antibiotics listed as critically important for human medicine by the World Health Organisation (WHO).

Year	Number of antibiotic treatments over entire production cycle (salmon)
FY17	0.04
FY18	0.00
FY19	0.07
FY20	0.03
FY21	0.00

We disclose antibiotic use on our Sustainability Dashboard, in our annual Sustainability Report and through the Global Salmon Initiative (GSI) annual Sustainability Report.

Year	Grams antibiotic per tonne of salmon produced		
	Marine	Hatcheries	Total
FY17	17.13	0.03	17.16
FY18	0	0	0
FY19	54.20	0.53	54.73
FY20	35.36	0.16	35.52
FY21	0	0	0

Sea for yourself

TECHNICAL FACTS

Environmental Management

TASSAL GROUP

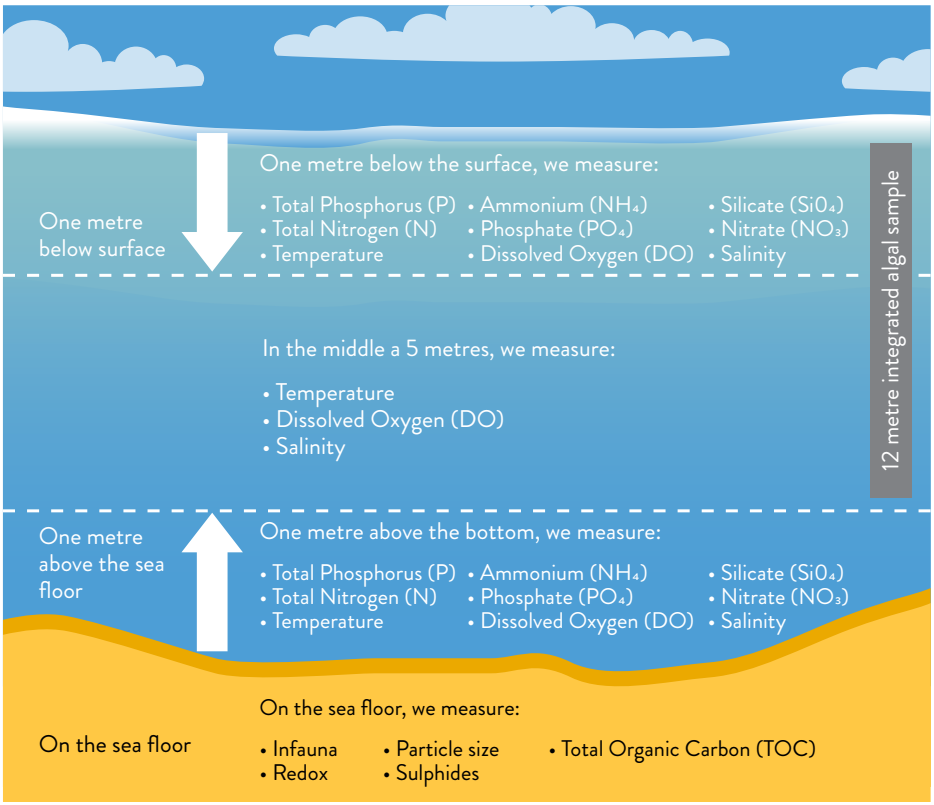
Broadscale Environmental Monitoring Program (BEMP)

Tassal participates in Broadscale Environmental Monitoring Programs (BEMP) throughout multiple locations in south-east and western Tasmania. This monitoring allows us to better understand the marine and estuarine health of our coastal waterways and potential impacts from finfish farming practices.

The monitoring programs have a water quality component (surface and bottom water) and a sediment component (sediment biology and chemistry). In addition, reef and seagrass monitoring is also undertaken in areas where these habitats form part of the local marine ecosystem. Sampling is conducted by environmental consultants on a regular basis – at least monthly and sometimes fortnightly. The BEMPs were initiated in 2009, and the D'Entrecasteaux Channel and Huon Estuary monitoring has been ongoing for over 12 consecutive years and is considered a world-class environmental monitoring program.

Where do we take samples from?

Water samples are taken from the surface, bottom and five metres deep in the water column. Sediment samples are taken from the seafloor annually and analysed for key environmental indicators, including redox potential, sulphide concentration and benthic infaunal biodiversity.

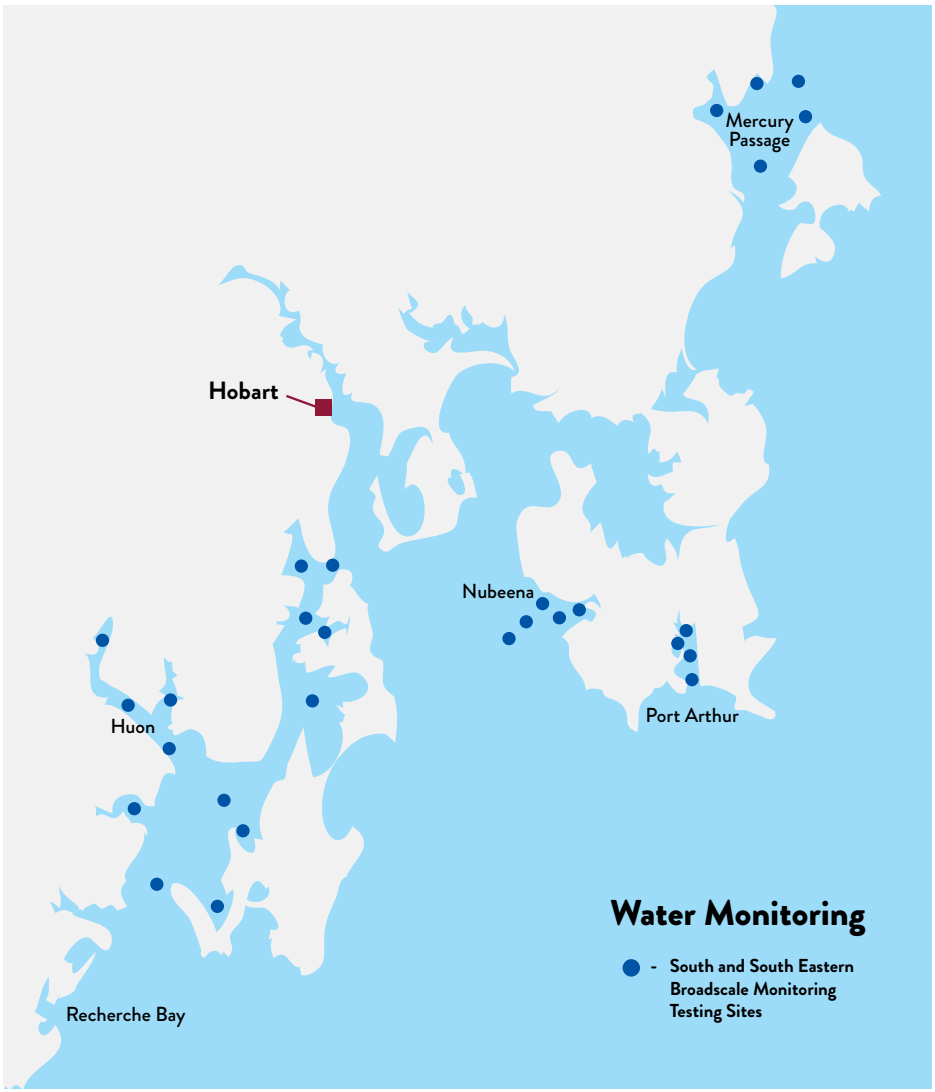


Environmental Management

There are over 40 different sampling stations throughout the state, including the D'Entrecasteaux Channel, Huon Estuary, Mercury Passage, Okehampton Bay, Port Arthur ,Tasman Peninsula and Macquarie Harbour. There is also an environmental control site in Recherche Bay that is sampled 15 times each year.

Water samples provide a vast amount of information about the health of the ecosystem. Testing includes water temperature, depth, salinity, pH levels and dissolved oxygen levels. Sediment sampling also provides important information on seabed condition, particularly in relation to long term ecosystem stability.

Other tests require further analysis and samples are sent to Analytical Services Tasmania to test for chlorophyll, microalgae (or phytoplankton) and nutrient concentrations. A range of different (and highly specialised) sampling apparatus are specially designed for collecting a range of different sample types, and at different depths in the water column.



Sea for yourself
Climate Change

TECHNICAL FACTS

TASSAL GROUP

Tassal acknowledges and supports the scientific consensus on climate change. We take responsibility for improving the energy efficiency of our operations, transitioning to renewable energy, and investing in new technologies. We are exploring partnerships and initiatives to unlock Blue Carbon opportunities and support food systems adaptation.

Understanding the environment and the effects of climate change is crucial to our ongoing operations, particularly in summer where water temperatures affect the growth of our salmon.

We acknowledge the need to adapt our farming practices to maintain production of our stock within an environment that is more predisposed to the physical effects of climate-induced weather events.

We work with external scientists to identify emerging climate trends, system responses and to undertake comprehensive broadscale monitoring.

We have developed options for adapting to climate change, including:

- Selective breeding program for salmon, with prawns now also a focus.
- Improved summer feed diets.
- Modified farming strategies, technologies, and practice.
- Species diversification with the addition of our prawn operations.
- Geographic diversification.

We report our energy consumption and greenhouse gas (GHG) emissions to the Commonwealth Government annually under the National Greenhouse and Energy Reporting scheme.

Year	Scope 1 (tonnes CO_2-e)	Scope 2 (tonnes CO_2-e)	Total (tonnes CO_2-e)	New to scope
FY18	21 426	8 119	29 546	
FY19	27 414	12 395	39 809	Prawn farm rehabilitation in QLD (on coal-based grid) & NSW. Additional energy sources required for Rookwood hatchery post an electrical fire.
FY20	35 883	22 660	58 544	Prawn farm expansion and operations in QLD (on coal-based grid) & NSW. Introduction of the well boat to salmon operations.

GHG emission and energy use data is audited annually through our Aquaculture Stewardship Council (ASC) certification audits. Our feed supplier also publishes a sustainability report which documents the average GHG emissions of their annual feed manufacture.

Year	**Total carbon footprint of feed** (Co_2-e/kg)
CY18	5.79
CY19	5.08
CY20	4.59

Our feed supplier has an ambition to achieve a reduction of 30% of Scope 1 & 2 emissions by 2030 and with a 2018 baseline. In addition, under the Science Based Targets programme, they have committed to a 58% reduction per unit of value-added by 2030 in GHGe for our supply chain with a 2018 baseline. This will be achieved through engagement with suppliers.

Our newly integrated Responsible Business Platform involves the identification of targets, progressive KPI's, expanded disclosure and ongoing reporting across environment, social and governance agendas.

As part of this work, we are in the process of establishing emission reduction targets.

Sea for yourself

TECHNICAL FACTS

TASSAL GROUP

Health Management – Prawns

Every pond, every day.

We have prawn health management plans in place for each of our farms to ensure appropriate disease management and prevention. We check every pond, every day and take samples weekly.

Our sites are visited regularly by members of our Prawn Health team, including our two company veterinarians.

We implement third-party certification standards across our operations including the Aquaculture Stewardship Council (ASC) shrimp (prawn) standard. Under this standard we must comply with strict requirements related to disease prevention including the filtration of inlet water to minimise the entry of pathogens and annual farm survival rates over 60%.

Biosecurity

Each of our prawn farms have a biosecurity plan which outlines the assessment of biosecurity risks for each farm and defines the measures implemented to prevent or reduce the risk of:

- **Disease introduction into the farm.**
- **Disease spread within the farm.**
- **Disease spread from the farm to the aquatic environment, or to other aquatic enterprises.**

These plans also include emergency response procedures for disease outbreaks.

Implementation of effective biosecurity and health management is integral to any successful production system, delivering a range of benefits, including:

- **Improved animal health and performance through the prevention of disease outbreaks.**
- **Reduced disease transmission and amplification within and between farms and regions.**
- **Early disease detection allowing faster response to reduce impact.**

TECHNICAL FACTS

Sea for yourself

Health Management – Salmon

TASSAL GROUP

Every pen, every day.

We have fish health management plans in place for each of our regional farming zones to ensure appropriate disease management and prevention.

Our sites are visited regularly by members of our Fish Health team, including our two company veterinarians.

We implement third-party certification standards across our operations including the Aquaculture Stewardship Council (ASC) salmon standard. Under this standard we must comply with strict requirements to record and classify 100% of our mortalities. We need to be able to demonstrate that we are working hard to reduce mortalities, track disease and have farm specific plans to reduce both disease and mortalities.

Our feed centre allows us to use remote technology to complete routine checks to improve stock health and security by monitoring for threats such as jellyfish, seals and storm events.

Biosecurity

Implementing, maintaining, and monitoring biosecurity controls is an important part of disease management. We incorporate biosecurity measures into our fish health and welfare plans, as well as having specific standard operating procedures and policies in place. Biosecurity is built into every level of decision making across all of our operations, from planning our fish stocking on leases (i.e. single year classes and fallowing), right down to how and when equipment and vessels are cleaned and disinfected. We use random audits, education of our team members, positive release forms and information technology systems to facilitate and monitor appropriate biosecurity measures.

We have seen a decrease in outbreaks across our farms over the past three years.

	Outbreaks
FY19	4 (POMV* Channel, POMV Storm Bay, POMV Southern, RLO** Okehampton)
FY20	2 (RLO Macquarie Harbour, RLO Okehampton)
FY21	1 (RLO Macquarie Harbour)

Vaccinations

We now vaccinate all our fish before they go to sea, and we customise the vaccination package to suit the farms they are going to so that each fish is immunised against those pathogens we know may cause disease in the specific area of the farm in question. We monitor vaccine efficacy and work with the government animal health laboratory to monitor vaccinated pathogens for any changing presentation. Tassal also directly funds and collaborates in research to improve animal health & welfare outcomes.

In 2021 all fish put to sea were vaccinated against POMV and zone specific endemic pathogens. We also continue to support financially and in-kind the ongoing development of new multivalent vaccines.

Survival (FY21)

Freshwater	79.5%
Marine	93.6%

Regulatory requirements

All Tasmanian salmon farmers must report as soon as possible any suspected or known incidents of disease or mortality affecting greater than 0.25 per cent of fish per day for three consecutive days in any individual cage.

We have a dedicated information technology system to ensure we can monitor mortality rates in real time to ensure timely response and accurate reporting.

**Pilchard orthomyxovirus (POMV) is the most important infectious disease in the Tasmanian salmon industry. This disease causes sporadic outbreaks in naïve stock and is considered endemic.*

***Rickettsia-like organism – Tasmanian RLO, an endemic bacteria that unlike other bacteria live within cells rather than between them.*

Sea for yourself

TECHNICAL FACTS

Escapes & Algal Blooms

TASSAL GROUP

We implement protocols to manage the associated risks and significantly reduce the likelihood of escapes from our salmon and prawn farms.

Our comprehensive Escape Prevention and Response Protocol includes mitigation measures including staff training and a comprehensive regime to routinely monitor the integrity of our nets and screens.

Salmon

No wild Atlantic salmon populations exist in Tasmanian waters, and research indicates that escaped Atlantic salmon do not successfully forage outside of the pens and do not thrive in the wild (Steer and Lyle 2003).

FY21 salmon escapes = 0

Prawns

Screens are installed on outlet monks to ensure small juveniles are not carried out of the ponds. These are removed once our prawns reach 1g in size.

During harvest and stock transfer operations, effective secondary containment measures are applied to prevent the escape of animals.

FY21 prawn escapes = 0

Management of algal blooms

Algae may cause harm to fish on marine farming sites, causing toxic or mechanical damage to fish depending on the species and density.

Algae sampling is carried out at each of our active leases every day before the commencement of feeding.

We have an internal algae monitoring protocol that outlines sampling requirements and responses to alert and action levels.

Responses include:

- Repeat sampling for species verification.
- Escalation to management.
- Observe fish behaviour.
- Stop feeding.
- Consider venturation of pens.
- Sample affected fish.

Other methods including tarping or oxygen generation may be employed for severe blooms on a case-by-case basis.

Sea for yourself
Feed

TECHNICAL FACTS

TASSAL GROUP

The nutrition of our salmon and prawns plays a crucial role in our sustainability journey.

We work closely with our feed suppliers to maintain sourcing and traceability criteria to ensure we meet the requirements of all relevant third-party certifications.

Feed conversion ratios

Economic feed conversion ratios (eFCR) represent the quantity of feed used to produce the quantity of fish harvested.

Species	FY19	FY20	FY21
Salmon	1.44	1.26	1.28
Prawns	N/A	1.96	2.06

What's in our salmon feed?

Land animal ingredients	34.5
Agricultural ingredients	51.1
Fish oil (reduction only)	8
Fish meal (all sources)	6.4
TOTAL	100

What's in our prawn feed?

Land animal ingredients	5.9
Agricultural ingredients	61
Fish oil (reduction only)	32.1
Fish meal (all sources)	1
TOTAL	100

Marine ingredients

Fishmeal and fish oil are both finite resources that are shared across a range of users with increasing demands, from direct human consumption to aquaculture to pork and poultry production.

Forage Fish Dependency Ratios (FFDR)

The aquaculture industry has significantly reduced the inclusion rates of fishmeal and fish oil from forage fish in feeds over the past two decades. Our third-party certification under the Aquaculture Stewardship Council (ASC) standards includes requirements to comply with Forage Fish Dependency Ratios (FFDR) to support the trend towards lower inclusion rates and increasingly efficient use of marine resources.

The ratios, one for fishmeal and another for fish oil, calculate the dependency on forage fisheries through an assessment of the quantity of live fish from small pelagic fisheries required to produce the amount of fishmeal or fish oil needed to produce a unit of farmed salmon.

Year	FFDRm	FFDRo
Certification requirement	<1.2	<2.52
FY17	0.37	1.67
FY18	0.31	1.93
FY19	0.37	2.15
FY20	0.40	2.19
FY21	0.27	2.17

The aquaculture industry is able to improve FFDRs by using fishmeal and fish oil from trimmings. Trimmings are by-products of fish processed for human consumption and may be excluded from the calculation as long as the origin is not from a critically endangered, endangered, or vulnerable species under the IUCN Red List of Threatened Species.

Feed

Certification of marine ingredients

Our feed supplier commissions an independent annual marine assessment report to discloses the FishSource scores of species likely to be purchased for the period and use a mass balance approach to ensure sufficient volumes of compliant fishmeal and fish oil are purchased to cover the volume of feed sold to certified customers.

Volume of purchased ASC compliant ingredients		
Year: 2020	**MT**	**%**
Fish meal	11,681	100
Fish oil	6,448	76

Agricultural ingredients

Agricultural ingredients include wheat, soya derivatives, corn gluten and vegetable oils.

Soy

We want to ensure our feed suppliers only purchase vegetable ingredients that have been cultivated by farmers who have not contributed to deforestation, and are protecting sensitive ecosystems and endangered species.

Soy protein concentrate represent a relatively small percentage of our total feed ingredient inclusion (4-5%). 100% of the Soy Protein Concentrate used in our feed has been ProTerra certified since 2016. ProTerra certification is an additional safeguard to the social responsibility and environmental sustainability of our supply chain. The requirement in the Proterra standard is that soya cannot come from agricultural land that has been cleared for cultivation after 2009. Soy bean meal is also included in our prawn feeds and is certified by the US Soy Sustainability Assurance Protocol, which is an industrywide initiative that demonstrates commitment to responsible growing practices and sustainability through setting clear, verifiable standards of industry practice, including prohibiting illegal deforestation.

By-products

Fish, like all animals require nutrients to live and grow. The main nutrients required are protein, fat, and carbohydrates. Proteins can be supplied to diets in many forms including land animal by-products.

Rendered by-products capture valuable nutrients that would otherwise be lost in the human food chain and their use acts to reduce waste.

All our land animal raw materials are sourced exclusively from Australian producers who are accredited by the Australian Renderers' Association (ARA).

Australian renderers have been at the forefront of developing quality assurance to improve the integrity and ever-increasing standards for food safety. The Australian Renderers Association launched its Code of Practice in 1994 and in 2001 provided the basis for the Australian Standard for Hygienic Rendering of Animal Products (AS 5008:2001). It encompasses quality assurance components reflected under ISO 9002 guidelines and application of Hazard Analysis and Critical Control Point (HACCP) methods.

Traceability

Our third-party certifications require us to provide evidence of traceability of feed ingredients that make up more than 2% of our feed including source, species, country of origin and harvest method. Marine ingredients, soy and other raw materials can be traced to country of origin (e.g. when the fish was captured or processed, or where the soya was grown).

Feed innovation

There has been increasing focus over many years on overcoming traditional reliance on formulating feeds from conventional but finite marine ingredients, particularly fishmeal and fish oil. While the fishmeal and fish oil inclusion rates in aquaculture feeds have followed a steady downward trend as the feeding efficiency of aquaculture systems have advanced, we understand that selective use alone is not enough to ensure that the required long-term growth rates can be sustained by the sector. A further solution that has emerged in recent years is the application of new raw materials and specialty ingredients, commonly known as novel ingredients. These technologies can be used both through replacement and interchange with conventional ingredients.

Our newly integrated Responsible Business Platform involves the identification of targets, progressive KPI's, expanded disclosure and ongoing reporting across environment, social and governance agendas.

As part of this work, we are in the process of establishing targets related to feed composition and innovation.

Sea for yourself
Food Safety

TECHNICAL FACTS

TASSAL GROUP

Our quality management system is centred around a risk-based food safety approach known as HACCP (Hazard Analysis Critical Control Point).

This system provides for a structured risk management system in which all potential hazards are identified for each step of the processing operation and assessed for likelihood of occurrence and severity of potential negative outcomes, and appropriate monitoring and risk mitigation strategies are implemented. One hundred percent of Tassal's products are produced in accordance with a defined HACCP plan.

100% of our seafood processing facilities and contract processors hold an accreditation to a Global Food Safety Initiative (GFSI) benchmarked food safety standard.

Product recalls

We have an internal product recall procedure to provide guidance for the orderly recall or withdrawal of any food product that is sold or produced for sale by Tassal. The procedure also details the requirements for mandatory reporting to the authorities in certain situations where the public may be at risk, and responsibilities of our recall committee.

Product recalls in FY21= 0
Market bans in FY21 = 0