

Dairy Production

About **one third** of Australian dairy production is exported making the farm gate price closely linked to the export price.

Popular breeds in Australia



Holstein-Friesian

Jersey

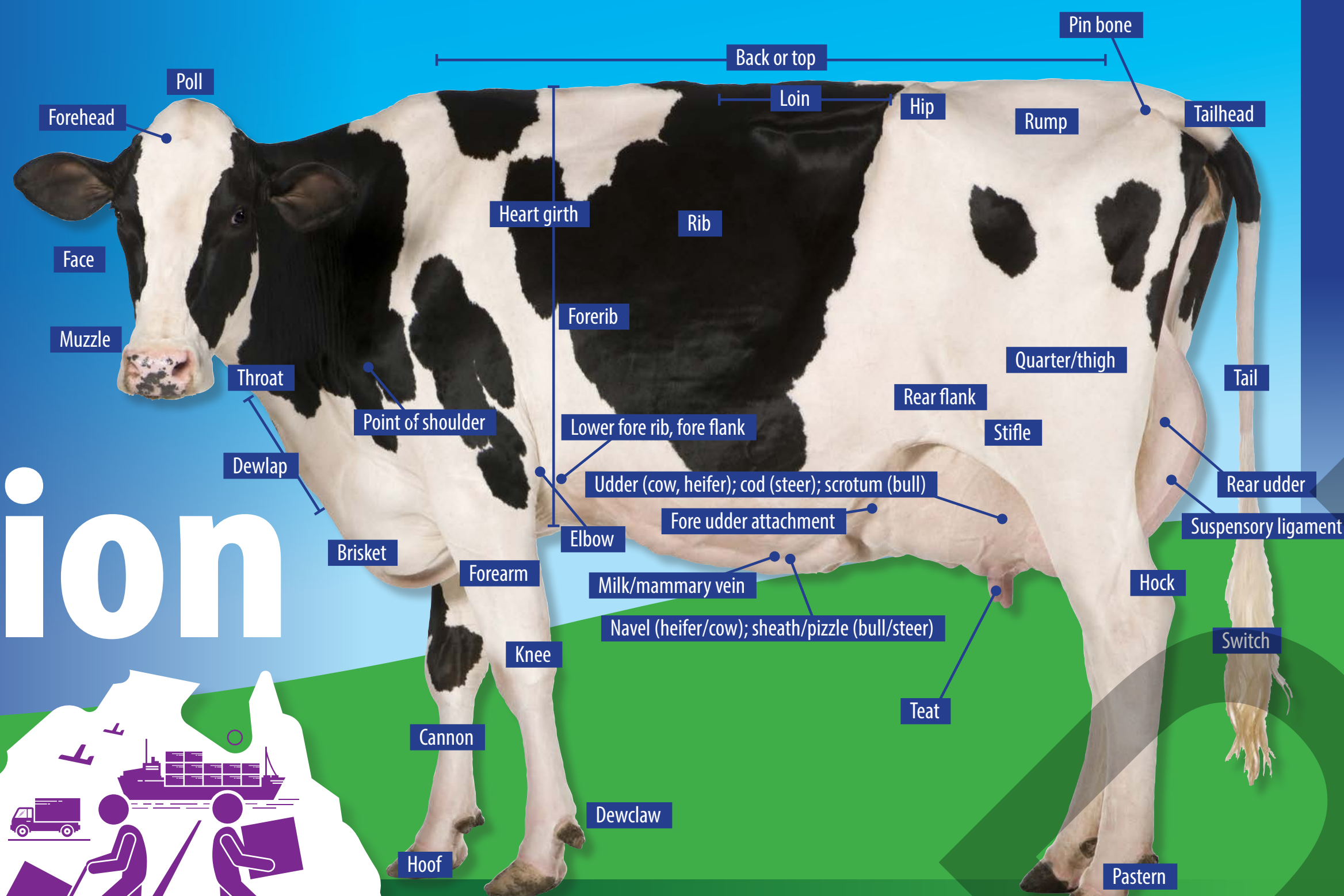
Aussie Reds

Ayrshire

Illawarra

Guernsey

Brown Swiss



Dairy production is worth around **\$570 million** (farmgate value) to the NSW economy each year

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Processing milk for consumption:

In its raw state, milk contains naturally occurring bacteria that could be harmful if consumed by humans. In Australia all dairy products must be heat treated prior to consumption, to reduce this risk. Milk is treated three ways to kill harmful bacteria and extend shelf life and consumer appeal without altering its basic composition.

Refrigeration: milk is cooled immediately after milking and stored at or below 4°C until it is processed.

Pasteurisation: to kill harmful bacteria milk is partially sterilised by heating it to 71°C for 15 seconds, rapidly cooled to 4°C or below and then refrigerated. The milk is then safe for human consumption and extends its shelf life.

Homogenisation: milk is an emulsified colloid where liquid fat droplets (cream) are dispersed throughout the water component of milk. The cream is insoluble and therefore separates and rises to the top of the milk. Homogenisation is a mechanical process where milk is passed through fine nozzles under high pressure to distribute the cream evenly throughout the milk and prevent it from separating. This creates a consistent tasting product for consumers.

Components of milk

87% Water

3.4% Protein (mainly casein and whey)

4.5% Carbohydrate (called lactose or milk sugar)

4.1% Fat (called cream or butterfat)

1% Minerals (Ca, P, Na, Cl, S) and vitamins (A, D, B, including riboflavin, thiamine, niacin)

The most common breed is **Holstein-Friesian** because they have the **highest volume** milk/cow production
Australian Holstein-Friesian cows produce ≈ 35L/day and 6,170L in a lactation period

Current and emerging technologies in the dairy industry include:

Animal technologies e.g. Artificial Insemination, Embryo Transfer, herd testing, electronic cow identification, automated gates, heat detection and tracking devices, pregnancy diagnosis and walkover weigh systems.

Dairy shed technologies e.g. robotic milking, automated cup removers and automated mastitis detection.

Pasture and feeding technologies e.g. drones, automated feeding systems, soil moisture probes and variable rate irrigation.

Management technologies e.g. integrated electronic real-time marketing, finance, infrastructure, pasture and herd management software and applications.

PROCESSING DAIRY PRODUCTS

PHYSICAL: separation, churning and dehydration are used to process the milk. No microbes or chemicals are used.

FULL CREAM MILK

MICROBIAL: alters the chemical composition of the full cream milk through fermentation and coagulation to create a new product.

SEPARATE SKIM/LITE MILK

Skim and lite milk are the products left after cream has been skimmed from the full cream milk. The products are classified on the fat content of the final product (amount of cream removed). A centrifugal separator spins full cream milk at high speed resulting in the cream separating from the other milk components and creating skim milk.

CREAM

Cream is produced by spinning pasteurised, non-homogenised milk at high speed. Centrifugal forces cause the fat globules (cream) to separate from the other milk components

BUTTER

Butter is made by churning (agitating) cream until it thickens into the yellow product we buy at the supermarket. Buttermilk is the by-product of making butter.

DEHYDRATE POWDERED MILK

The solids left behind when water is removed from milk through evaporation. Powdered milk has a longer shelf life and can be easily transported.

FERMENT WITH BACTERIA

YOGHURT

Yoghurt is made by fermenting milk with beneficial bacteria. The bacteria convert lactose (sugar present in milk) to lactic acid, thickening the milk and giving it the tangy taste characteristic of yogurt. The yogurt is then cooled and can be flavoured with fruit, sugar, sweeteners or flavourings.

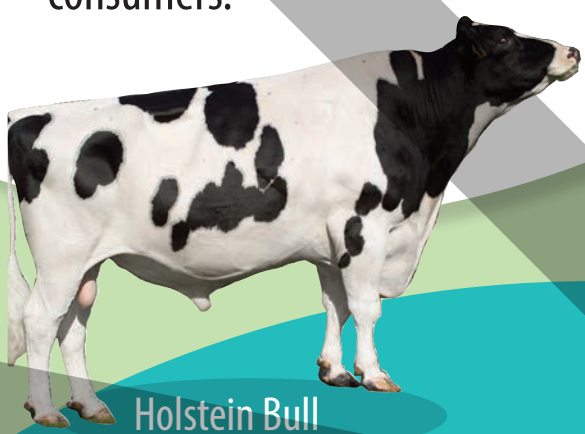
ADD BACTERIA CHEESE

Cheese is made when starter culture (bacteria) is added to pasteurised milk. This causes the milk to coagulate and form curd. Once the curd is separated from the remaining liquid (whey) it can be salted, moulded and aged. Different cheeses are made by changing the processing method used, for example:

Soft cheeses: Brie, Camembert, Feta
Hard cheeses: Cheddar, Gouda, Parmesan
Blue cheeses (ripened with green moulds): Gorgonzola, Roquefort, Stilton

A2

A2 milk only contains the A2 variant of β-casein protein. It is produced by cows that are homozygous for the A2 gene.



Holstein Bull



Jersey Cow

MALE

- Bull (uncastrated male)
- Steer (castrated male)

FEMALE

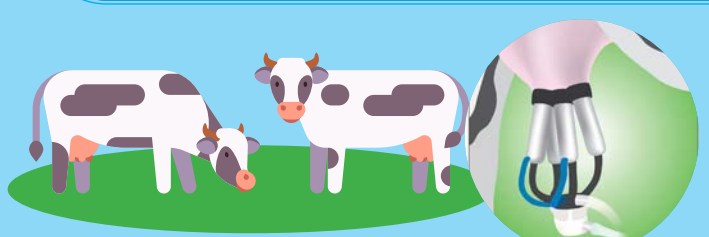
- Cow (female that has had a calf)
- Heifer (female that has not had a calf)

OTHER TERMINOLOGY • Calf • Weaner • Yearling • 2 tooth • First calf heifer

BREEDING

- Gestation length 283 days
- Oestrous length 21 days
- Standing heat approx 15 hours
- Cattle are nonseasonal and polyestrous breeders

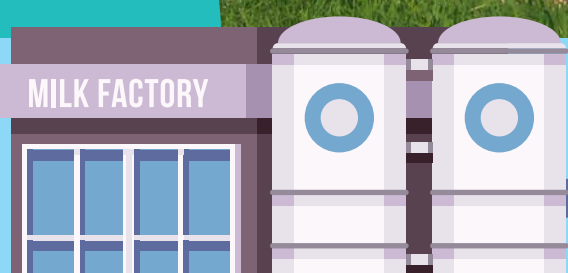
Milk production and marketing chain



MILK PRODUCTION ON FARM
Milk is harvested from cows and stored in a refrigerated vat on-farm.



TRANSPORTATION OF CHILLED MILK
Refrigerated tankers collect the milk from the dairy and transport it to the processing plant. The driver assesses the milk volume, taste, smell and appearance.



MILK PROCESSING AND PACKAGING

Milk is stored in vats and tested for quality including antibiotics, sediment (dirt), somatic cell count, bacterial plate count, butterfat percentage and protein percentage.



The quality of the milk determines the price paid to the producer.

Primary processing: pasteurisation and homogenisation.

Secondary processing: manufacturing of value-added products e.g. fat reduced milk, cheese, yoghurt, ice-cream, powdered milk etc. Final products are packaged for distribution.



TRANSPORTATION OF PACKAGED DAIRY PRODUCTS

Value-added dairy products are transported to domestic or export consumer markets and distributors e.g. wholesalers, retailers and food services.



SALES AND RETAIL

Branding and marketing campaigns affect sales to final consumers and the creation of markets. Consumer requirements affect all stages of production and processing.