

Check that milk is suitable to go in the vat

For milk quality reasons, all cows must have their colostrum milk withheld from the vat for at least eight milkings after calving. Colostrum may be present for longer in induced cows, and milk should be withheld from the vat for at least 10 milkings.

Antibiotic withholding periods for milk, cull cow and calf meat need to be observed for cows that received Dry Cow Treatment (DCT).

3.1 Ensure each cow has exceeded her Dry Cow Treatment Minimum Dry Period before putting her milk in the vat or selling her calf.

Dry Cow Treatments are antibiotic preparations that are infused into each quarter of the udder immediately after the last milking of a cow's lactation. The formulations are designed to remain in the udder in concentrations high enough to kill mastitis bacteria for relatively long periods (20-70 days depending on the product used).

Withholding periods

Generally, withholding periods refer to the minimum period of time that must elapse between the last treatment of an animal with a veterinary medicine and the supply of products (meat or milk) from those animals for food consumption. After treatment with a medicine, the length of time that meat must be withheld is usually longer than the withholding period for milk.

When using intramammary Dry Cow Treatments in the herd, there are two principles relating to withholding milk that must be well understood:

- All Dry Cow Treatments are registered with a specified Minimum Dry Period after treatment. This is the minimum time that must elapse between administration of the treatment and calving.
- As well as a Minimum Dry Period, all Dry Cow Treatments have recommended withholding periods for milk.

Confidence – High

The Minimum Dry Period for Dry Cow Treatment is a stipulated requirement to satisfy international and domestic standards for food purity.

Research priority – Low

Assessment of antibiotic residue in calves may warrant research.

For milk:

- The withholding period for milk refers to the time that must elapse after calving (rather than after treatment) before milk is supplied for processing.
- A different withholding period for milk applies if the cow calves before the Minimum Dry Period has elapsed (see table following page).

For cull cow meat:

- The withholding period for meat applies from the date that the cow is treated with Dry Cow Treatment.

For bobby calf meat:

- There is no meat withholding period specified for calves born after the Minimum Dry Period – although at least four days must elapse between their birth and slaughter for welfare reasons.
- Calves born before the Minimum Dry Period has elapsed are subject to the same meat withholding period stated on the label for the cow. The withholding period starts from the date that the cow was treated if the calf has not suckled or from the date of the calf's last suckle, if it has suckled.

The likelihood of antibiotic residue in bobby calf meat depends on (1) the absorption of antibiotic from the mother's bloodstream (Rangel-Lugo et al 1998) and (2) the intake of antibiotic from colostrum. Limited information is available on antibiotic residues in calves born to cows given Dry Cow Treatment. To protect the \$2.6 billion Australian beef industry, withholding periods for calves are interpreted conservatively to minimise the risk of residue because there is no substantial set of research data on Dry Cow Treatment residues in calves. The safety net gives rise to markedly different actions for bobby calves born before the Minimum Dry Period according to whether or not they have suckled, however there is no information on whether these actions are necessary from a biological point of view. For calves born after the Minimum Dry Period has elapsed, the cow's colostrum will only contain traces of antibiotic (if any) and absorption of most Dry Cow Treatment antibiotics from the calf's gut is relatively poor.

Farmers should not restrict the colostrum intake of calves during the first 12 hours after birth despite the possibility of having to keep some calves for a longer period before sale. Health and survival rates are significantly depressed in colostrum-depleted calves.

Remember:

- If cows calve early or a decision to cull them during the dry period is made, the date of treatment and the withholding period of the particular product must be known.
- Recommended withholding periods for milk and calf meat are longer if cows calve before expiry of the Minimum Dry Period.
- Ensure that the 'dry cow' paddock is well away from the milking herd so that cows given Dry Cow Treatment cannot accidentally rejoin the milking herd.
- Dry cows should be clearly marked.
- If there is any possibility that milk may contain antibiotic residue, it should be withheld from the vat.

When Dry Cow Treatments are used according to directions on the label and the appropriate Minimum Dry Period and withholding periods are observed, antibiotic residues will not exceed Australian Maximum Residue Limits. (Organisations responsible for food safety, such as the National Regulatory Authority in Australia, set Maximum Residue Limits and they may vary from country to country.)

Each product has its own specified withholding periods.

Recommendations to minimise the risk of antibiotic residues in meat or milk after use of Dry Cow Treatment are given in the Countdown Downunder Farm Guidelines for Mastitis Control Fact Sheet D and advisers should emphasise these to their clients. A table of recommended withholding periods for Dry Cow Treatments is repeated below, including some minor updates (current for October 1999).

Technote 14.5 describes the active ingredients and spectrum of activity for these products.

Technote 4.10 describes tests for antibiotic residue.

Advisers should check the NRA web-site for up-to-date information on registered Dry Cow Treatment products: www.dpie.gov.au/nra

Recommended withholding periods for milk and meat (days) following use of each Dry Cow Treatment (October 1999). Withholding period – WHP; Dry Cow Treatment – DCT; Minimum Dry Period – MDP.

	CULL COW MEAT WHP after date of DCT	MDP	MILK WHP after date of calving		CALF MEAT In cows that calve BEFORE the MDP	
			For cows that calve BEFORE the MDP	For cows that calve AFTER the MDP	For calves that suckle – WHP after the calf's last suckle	For calves that not suckle – after date of dam's DCT
Ampiclox Dry Cow	30	30	10	96 hours* or 8 milkings	30*	30*
Cepravlin Dry Cow	21	56	Test after 4 days*	96 hours or 8 milkings	21*	21*
Elaclox DC	30*	30*	21 *	96 hours or 8 milkings	30*	30*
Elaclox DC Xtra	30	35	21 *	96 hours or 8 milkings	30*	30*
Noroclox Dry Cow	30	30	30	96 hours*	30*	30*
Orbenin Dry Cow	30	30	21	96 hours or 8 milkings	30*	30*
Orbenin Enduro	30	35	21 *	96 hours or 8 milkings	30*	30*

Figures with an asterisk are not from material approved by the National Registration Authority, but provided by the pharmaceutical companies as consistent with NRA-approved withholding periods for other products. Contact the manufacturer or a veterinarian for further information.

Confidence – High

Exclusion of colostrum from the vat is motivated by factory standards for milk quality and is reflected in milk payments.

Research priority – Low

Milk from the 'colostrum mob' of cows is a good source of nutrient for replacement heifers.

3.2 Ensure that milk from the colostrum phase (first eight milkings) is not included in the vat (at least 10 milkings for induced cows).

Colostrum or 'first-milk' is thick, yellow, and sticky and contains very high levels of blood proteins (immunoglobulins, particularly IgG1) that help protect newborn calves against disease.

These immunoglobulins are actively transported from the cow's blood into the mammary secretion during the eight weeks prior to calving. The first colostrum can have an IgG1 concentration more than 100 times greater than normal milk. Following each milking, the pool of IgG1 in the udder is steadily lowered until depleted.

Colostrum also contains high numbers of somatic cells. The high influx of white blood cells into the udder at this time is generally not due to mastitis (bacterial infection) but is a response to some tissue damage as lactation begins. These cells have associated high levels of enzymes that can degrade milk solids.

Colostrum has a significant effect on the processing efficiency of all dairy products when levels are greater than 0.3% IgG1.

Because the concentration is so high in first-milk, the milk of only two cows in the first 48 hours of lactation may be sufficient to raise the level of the consignment above 0.3% IgG1 even when it is diluted with milk from 100 'normal' cows.

Changes in product quality which occur at greater than 0.3% IgG1 include:

- Butter – a darker colour, 'off' flavours and downgrading.
- Casein – decreases in yield due to changes in curd characteristics and poor setting.
- Cheese – increases in setting times, poor set, decreases in yield due to lower casein levels, 'off' flavours, shorter shelf life due to high moisture retention by globular proteins, and body defects.
- Condensed milk – graininess.
- Cottage cheese – agglutination of starter bacteria.
- Milk powders – increases in drying times due to high moisture retention in globular proteins, and difficulties in achieving a standard product.
- Pasteurised milk – cream plugs.
- UHT milk – shorter shelf life and deposit.
- Whey – poor crystallisation due to altered composition.

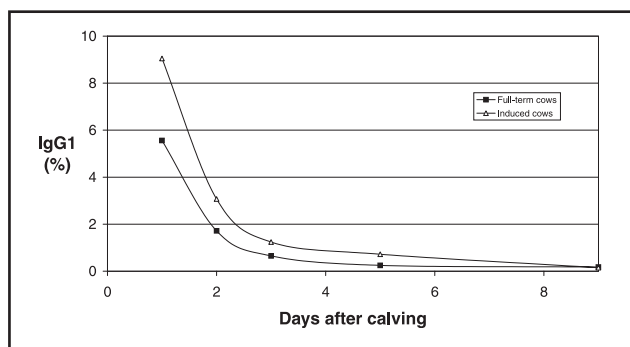
There are also significant cleaning problems associated with processing colostrum milk in the factory. It requires more frequent and more comprehensive cleaning of all heat transfer surfaces, increases the down-time on factory dryers and evaporators, and increases chemical usage.

Reducing colostrum levels in milk has made very significant improvements in processing milk to manufactured products. For example, after Bonlac Foods Ltd introduced colostrum testing and included colostrum in their milk quality payment scheme in 1993, farm level compliance markedly increased and products could be made to export specification 2–3 weeks earlier than was previously possible.

Depletion of colostrum in milk after calving

IgG1 levels of up to 15% in the first colostrum fall to minimum levels of 0.15% by about eight days after calving. Levels of 0.3% and less are usually attained after eight complete milkings. Cows milked prior to calving after receiving induction therapy also have high levels of IgG1, and levels don't fall to under 0.3% until after at least 10 full milkings (Auldust et al 1993).

Example of IgG1 concentrations in milk after calving (Rogers et al 1992)



In the past, farmers have visually appraised milk colour to ascertain when the colostrum phase has finished. This is not sufficiently reliable because milk that has lost its initial yellow-brown colour and looks white may still contain unacceptably high levels of colostrum. The converse may also be true. Milk from some cows or herds may be coloured for reasons such as high levels of beta-carotene in pastures or because the milk comes from Jerseys rather than Friesians.

You cannot assess milk quality by visual appraisal. It is more appropriate to withhold milk for the recommended number of milkings and to ensure that udders are being completely milked out.

Key papers

Auldust MJ, Coats S, Rogers GL, McDowell GH. Characteristics of mammary secretion during early lactation from naturally-calving dairy cows and cows induced to calve prematurely. *Aust J Dairy Technol* 1993;44:49-52.

Rangel-Lugo M, Payne M, Webb AI, Riviere JE, Craigmill A. Prevention of antibiotic residues in veal calves fed colostrum. *J Am Vet Med Assoc* 1998;213:40-42.

Rogers G, Coats S, Auldust M. Raw milk quality and product quality. In: Dairy Research Foundation dairy symposium proceedings, Camden, July 1992:16-27.

