



# Tallow Washing and Storage

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**Tallow is generally the most valuable product of a rendering operation, with quality dependent on good processing and storage procedures.**

**Poor handling of tallow at any stage during production will result in a lower quality product.**

Tallow must be effectively washed so impurities can be removed. If these impurities are not removed, the tallow will deteriorate during storage. Likewise, storage facilities must meet certain standards so tallow can be properly preserved.

### Removal of impurities

Before tallow can be stored, the fines remaining in the tallow after draining and pressing must be removed. Fines include particles that contain pigments and suspended particles of meal that may be separated from dry tallow by settling.

For the effective control of fines:

- Load the cooker to the recommended level to avoid overloading and maintain efficient end point control to ensure complete moisture removal during rendering.
- Lag the settling tank with insulating material or locate it in a warm part of the plant to reduce cooling of the tallow during settling.
- Do not water wash tallow unless it is necessary. Only dark-coloured tallow or tallow with fines which are difficult to settle should be washed, and then only if the following will be achieved:
  - Significant reduction in the settling time
  - No likelihood of emulsions being produced
  - Effective removal of fines
  - Reduction in colour
- Use a decanter or disc centrifuge to speed up the settling process.  
Settling tanks will not be needed if a centrifuge is used and tallow yield will be improved. Dry fines can be separated more efficiently with a centrifuge if they are fully wetted by washing with a stream of water introduced into the centrifuge feed pipe.

This will increase their density. Wetting of the fines does not create a problem with the tallow because the contact time is short. Gut tallow can also be washed by this method.

- Use filtration as an alternative to gravity or centrifugal settling of dry fines.  
The efficiency of filtration depends on flow rate, surface area of the filter, percentage of fines and packing characteristics of the fines. Filter aids such as diatomaceous earth have been used. The disadvantages of filters are the cost of the filter aid, the need to dispose of the spent filter aid and the need to constantly change the filter if the fines content is high.

### Gravity settling

Gravity settling may be used to remove impurities, provided the fines are dry and settled as quickly as possible.

When the settling tank is filled, the temperature of the tallow should be raised to 90-95°C. The temperature of the tallow should be checked with a thermometer located about 30cm from the bottom of the tank and away from the steam coils.

Once the desired temperature is reached, the heat should be turned off. Heating causes convective movement of the tallow which interferes with settling. Note that it may not be necessary to heat the tallow if the settling tank can be filled with minimum delay after rendering.

If the fines are dry, they can be settled over a longer period of time (8-24 hours) without affecting tallow. However, if the fines are wet – as a result of incomplete rendering or as a result of water washing – the fines must be settled within two hours.

Prolonged water contact with the tallow will result in an increase in FFA through water hydrolysis. The rate of hydrolysis is accelerated in the presence of salt.

### Tallow washing

Tallow rendered from finely ground raw material or gut offal, or tallow which contains wet fines, may present settling problems. If the impurities will not settle or if they are dissolved in the oil (for example pigments), some form of washing will be necessary.

If tallow washing is not handled properly, it can lead to an increase in the FFA in the tallow and cause tallow losses during settling due to emulsification.

Several points should be considered for the effective control of tallow washing:

- Before attempting any washing method in the byproducts plant, a preliminary test should be conducted in the laboratory to determine whether washing will form emulsions, and to indicate the amount of various chemicals required to obtain a good break and rapid settling of the insoluble impurities, or dissolution of suspended water soluble impurities. The best method is always the simplest one that works.
- The tallow should be heated and held within the temperature range of 80 - 100°C. Lower temperatures will allow bacteria and free enzymes to degrade the tallow.
- The contact time should be no longer than that required to dissolve or coagulate and settle the impurities. The longer the water and fines are in contact with the tallow, the higher the FFA and tallow colour. Even at temperatures which would inactivate the bacteria and enzymes, prolonged contact with water and fines promotes FFA production.
- Mixing should be just sufficient to bring both liquids into contact. Emulsification will result from over-energetic mixing.
- If separation of tallow and washing medium does not take place within two hours, use another method or use a centrifuge.
- Tallow washing is best conducted in conjunction with a disc or polishing centrifuge. This produces a clear bright oil, significantly reduces the contact time and eliminates bulky settling tanks.

Saveall tallow can be difficult to wash. This type of tallow is generally heated prior to washing. Prolonged heating of Saveall tallow will cause water hydrolysis, increasing the already high concentrations of free fatty acids.

The prolonged heating is often the result of attempts to de-stabilise the firm emulsions which bind the tallow. If an emulsion does form, the pH should be lowered to values of 4 - 5 with the use of acid so that the emulsion will disperse.

## Storage

Clean, dry tallow stored at the correct temperature will keep well. On the other hand, abuse of tallow during processing and storage will result in reduced shelf-life.

In addition to hydrolysis, tallow is subject to oxidative deterioration and colour fixation when exposed during processing and storage to air, high temperatures and light. Oxidative enzymes, trace metals and other impurities – such as haemoglobin – accelerate oxidation. Severe oxidation produces short-chain fatty acids, further increasing FFA content.

Recommendations for effective storage of tallow to avoid oxidation include:

- **Store tallow at the lowest practical temperature**
- **Ensure proper coil installation which will prevent scorching of tallow during storage**
- **Avoid repeated heating and cooling of tallow**  
Heating and cooling tallow further lowers its resistance to hydrolysis and oxidation.
- **Avoid unnecessary aeration**  
Use rubber pigs in conjunction with compressed air, rather than air alone, to transfer residual tallow left in lines after pumping. Run tallow inlet pipes to the base of the storage tank, or at least direct the flow down the wall of the tank.
- **Conserve the natural anti-oxidants contained in tallow**  
Naturally occurring phosphatides, tocopherols and carotenoids give tallow built-in resistance to oxidation. Excessive washing, aeration and overheating of tallow will deplete or destroy them.
- **If prior arrangements can be made with the tallow buyer, use approved synthetic anti-oxidants**  
Sometimes synthetic anti-oxidants are not

permitted because they may mask the true quality of tallow. When used as intended (to stabilise tallow during extended storage), they can be a valuable aid in maintaining quality.

- **Never use copper or zinc (including brass) where contact with tallow is likely**  
As little as 1 ppm of copper in tallow will result in accelerated rancidity.
- **Store dark and light tallows separately**  
Tallows with low and high FFA should also be separated.
- **Store tallow away from light**  
Storage vessels should be covered to keep out light and prevent airborne moisture, fines and dust from contaminating the tallow. Inspection hatches at the top of the vessel should be kept closed.
- **Inspect a storage vessel each time it is emptied and clean if necessary**

### Storage Conditions

If the storage vessel is partially full and is to be topped up daily, the tallow in the tank should be kept liquid by maintaining the temperature between 60° and 70°C. Agitators should be switched off overnight, and the steam should be turned down so that remaining fines or moisture will settle during the night. These can be run off next morning. Keeping the tallow liquid prevents layering of solid fat where the interface between each layer may contain moisture and fines.

**Short-term Storage** – Tallow can be safely stored in full tanks for one to three weeks by holding the temperature in the tank between 55° and 65°C.

**Long-term Storage** – Full storage tanks not requiring load-out for three to four weeks or longer should be drained of sludge and allowed to cool to ambient temperature. This will depend on the size of the storage vessel. Very large quantities of tallow in storage are often kept liquid because of the extra time required to re-melt the tallow before load-out.

Although it is sometimes recommended that the tallow be heated to 100°C or higher to pasteurise it before extended storage, this is not necessary if the tallow is clear. Tallow re-melt for load-out must be done slowly to avoid localised high temperatures.

The operator should be given at least 24 hours' notice so the tallow has sufficient time to melt slowly.

### Additional information

CSIRO, MRC Newsletter 78/4 "Factors Affecting the Quality of Tallow"

CSIRO, Proceedings of Meat By-Products Processing Workshop, 1986

Additional help and advice is available from Australian Meat Technology Pty Ltd. Phone:

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