

Dairy Titbits

A series on milking and udder health to help farmers get the most from their cows



How to choose the best milking liner for your herd

Many factors affect the performance of milking liners. Dairy consultant **Tom Greenham** sets out what to consider for fast, gentle milking



FACT FILE

Tom Greenham is a director of Advance Milking, a consultancy service for all aspects of udder health and milking machine performance. Advance Milking works with dairy farms across the UK and Ireland to optimise udder health, milk quality and milking efficiency. Mr Greenham also provides research, training and independent support to the dairy industry internationally. advancemilking.com

- Teats with pointed ends are more vulnerable to hyperkeratosis than blunt-ended teats
- “Carrot-shaped” teats, as are commonly found with Jersey genetics, are likely to benefit from a narrow barrel diameter and low compressive load or shaped liner
- Small teats are at higher risk of teat oedema caused by poor liner fit and less robust massage from the upper region of the barrel
- Short, square-ended teats, as seen in many Holstein cows, will be more suited to liners with high compressive load and shallow mouthpieces.

4 Liner materials and longevity
 Rubber tends to give a higher compressive load than silicon. This reduces risk of teat oedema, optimising milking speed.

LINER CHOICE CHECKLIST

- Establish priorities to work out what liner characteristics you need
- Assess the size and shape of your herd’s teats to allow appropriate choice of dimensions and compressive load
- For herds with a wide variety of teat sizes or shapes, consider

However, it may increase the risk of teat-end hyperkeratosis, compared with an equivalent silicone product.

Silicone liners tend to apply less force to the teat-end than rubber. This can significantly reduce hyperkeratosis risk but may result in more teat oedema and slower milk out.

Silicone also has a lower friction coefficient than rubber, increasing potential for liner slip. This can usually be overcome by reducing other risk areas for liner slip. Rubber deteriorates more rapidly than silicone, often requiring changing two to three times more often.

- All liners change in performance as they age:
- Liner barrels lose tension, leading to lower compressive load and slower milking speeds
 - Liner lips become more flexible, increasing air leakage and slip. ■

- specific solutions such as vented mouthpieces
- Ensure your machine settings are appropriate: different liners may require different vacuum and pulsation settings
- Make sure liner tension is correct: only use in shells intended for them

Milking liners are the only parts of the milking machine that directly interact with the cow. It is vital that this interface between cow and machine is optimised for each individual herd.

Choice of liner size, shape and materials, along with optimisation of machine settings, allow us to fine-tune liner performance for a fast but gentle milking.

Teat-end oedema inhibits milk flow, reducing milking speed and increasing mastitis risk. To avoid this, liners must:

- Fit snugly to the teat to prevent exposure of the top of the teat to high vacuum levels
- Deliver a robust compression of the teat-end to massage away accumulated fluid.

Teat-end hyperkeratosis (rough teat-ends) increases the risk of bacteria entering the teat. To reduce this, choose liners that:

- Reduce the compressive load applied to the teat
- Move the focus of pressure away from the teat-end.

There are several key factors to consider when deciding which liners are most suitable.

GETTING A GOOD FIT

Teat size and shape need to be considered when choosing a liner. Small teats are at higher risk of teat oedema caused by poor liner fit

1 Liner dimensions

Four facets of liner size must be considered:

- **Liner “lip” orifice** This must have a small enough diameter to provide a good seal around the base of the teat, preventing slips or “squawks”. It must also have a large enough diameter to prevent constriction of the teat base, avoiding swelling and restricted milk flow.

- **Mouthpiece depth** Larger depths have traditionally been considered more stable, giving less slip. However, this is largely down to a poor fit, causing high mouthpiece vacuums and more teat oedema. Smaller depths ensure more of the teat is within the liner barrel, increasing the effective massage of the teat-end and potentially reducing exposure of the teat base to excessive vacuum.

- **Barrel diameter** The barrel must be wide enough to allow the teat-end to expand as the canal opens. However, it should be narrow enough to prevent high mouthpiece vacuums, minimising teat oedema.

- **Barrel shape** Liner diameter is given at “mid-barrel”: 75mm from the mouthpiece.

Few teats are long enough to reach this point. Diameter at teat level depends on the amount of taper. Straight liners may only be 1-2mm greater at teat level, while highly tapered liners may be 6-7mm wider than the described diameter.

2 Compressive load

Compressive load is how much force the liner applies to the teat. It is significantly influenced by liner properties.

Thicker barrel walls and tougher compounds increase compressive load. Higher tension within the shell will also increase this pressure.

Compressive load varies throughout the liner, and is highest at mid-barrel and lowest near the mouthpiece. This means the further the teat penetrates the liner, the higher the force on the teat end will be, increasing hyperkeratosis risk.

Shaped (non-round) liners can be useful in distributing the force away from the teat-end. This reduces the risk for hyperkeratosis but may be less effective at counteracting teat-end oedema. Shaped liners may lead to higher mouthpiece vacuums, which can be counteracted by venting the mouthpiece.

3 Cow anatomy

Liner choice will also depend on the size and shape of the teats.



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