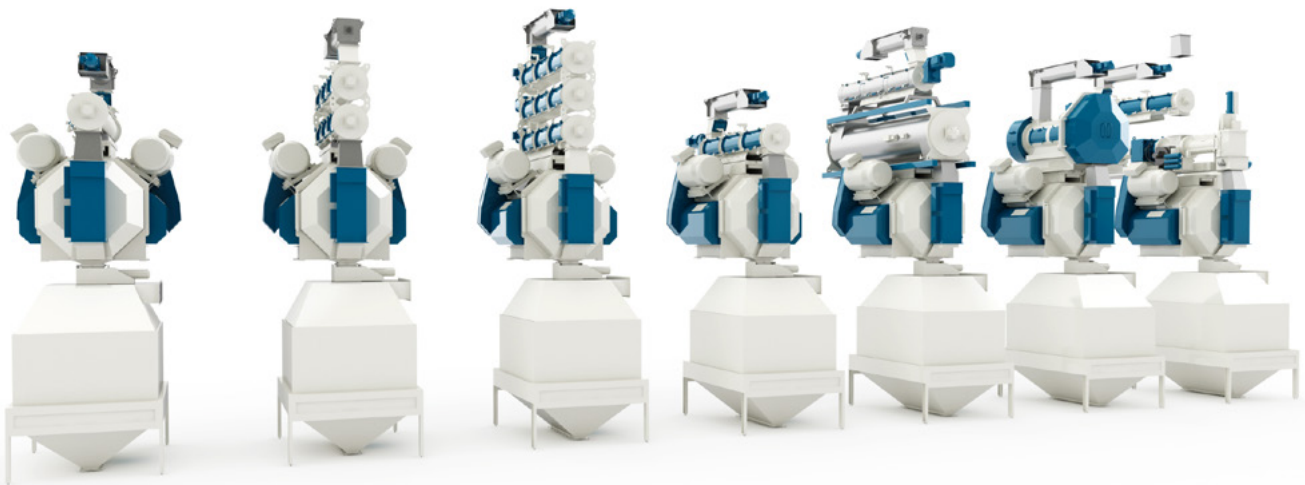




The Guide to Great Conditioning



If you want to produce the highest-quality pellet at the optimum price and capacity, rethinking your conditioning set-up could hold the key to unlocking new value. But choosing the right technology isn't easy. It depends on many factors – not the least the precise demands of your customer. Which is why the team at PTN, Almex and IVS has created this short guide on behalf of the Triott Group to help you navigate the process and identify the best solution for your unique needs.



What is conditioning? The basics

Conditioning is the process of producing a mash feed dosed with liquids (like steam, water, oil, molasses) to produce a homogenous product before pelleting. There are four key parameters for this process:



Temperature: Created by over-heated, dry steam (covered in our previous Digest: 'It all starts with steam' which you can [download here](#)).



Moisture content: Created by either steam or water. Both need to be dosed correctly.



Retention time: A machine that has the optimal dimensions for the capacity needed.



Mechanical friction: The amount of shear and pressure on the product.

What are the benefits of great conditioning?

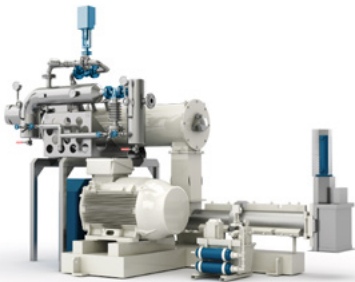
Optimizing the conditioning of your feed can deliver many valuable benefits:

- **Better pellet quality:** Specifically, a more durable and robust pellet.
- **Increased production capacity:** Due to less energy consumption in kWh/t and less choking of the pellet mill.
- **Increased nutrition:** Ensuring that the nutrients and vitamins in the feed are preserved due to proper gelatinization of the starch.
- **Safer feed (hygienization):** Eliminating salmonella and other bacteria by creating the right temperature and retention time in your conditioning system.

How you balance and achieve these benefits will always depend on your customer – and the optimum product for their needs. So how do you make that choice? Allow us to explain...

Choosing the right condition technology & set-up

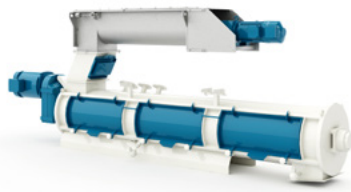
Which is the best system for you? Will a single conditioner do the job? Or could you benefit from a Hot Start Conditioner? Or a 2-in-1 system like a BOA compactor or Expander? Here we outline the critical information you need to know.



1. Steam dosing unit

Many conditioning problems are caused by poor steam quality which is simply not hot or dry enough. It's therefore essential that you start with a correctly dimensioned and well-designed steam set, connected to your conditioner to optimize both pellet quality and capacity.

The IVS steam dosing unit can reach temperatures of up to 150 °C at 2,2 bar pressure (virtually unheard of in the industry). It comes in 15 different sizes and is supported by 30-plus years of expertise. For more, watch part 1 of our Conditioning Special on steam, which you can find on the Triott website.

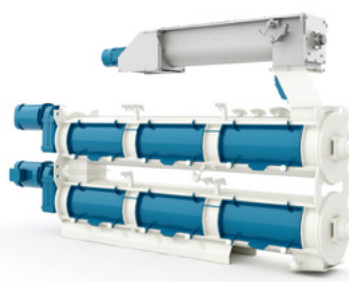


2. Single conditioner

- Max. 85 - 90 °C
- 10 - 20 seconds
- 3-4% liquids can be added

When should you use it? Ideal for working with raw materials like corn, wheat or barley which are high in starch content.

Remember: This is *not* first-in-first-out. For hygienization we recommend adding a Retention Time Barrel.

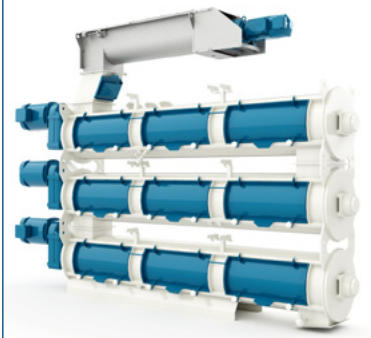


3. Double conditioner

- Max. 85 - 90 °C
- 20 - 40 seconds
- 3-4% liquids can be added

To double the retention time to 40 seconds at the same temperature, you can add a second conditioner.

Remember: For animal feed, dosing of steam and liquids takes place on the top conditioner only. The sooner you add this, the more time it has to penetrate your feed.

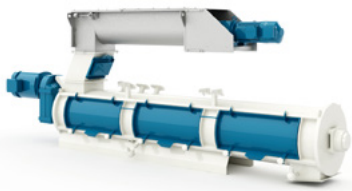


3. Triple conditioner





- Max. 85 - 90 °C
- 40 - 60 seconds
- 3-4% liquids can be added

You can even triple the retention time to 60 seconds by adding a third conditioner, again at the same temperature.

Remember: For animal feed, dosing of steam and liquids takes place on the top conditioner only. The sooner you add this, the more time it has to penetrate your feed.



5. Hot-start conditioner

-  Max. 85 - 90 °C
-  40 - 60 seconds
-  3-4% liquids can be added
-  Guaranteed first kilogram on temperature
Combination with additional conditioners possible

When should you use it? This is the solution if you *must have* every kilogram of feed heat-treated from the beginning of each batch. Ideal for poultry feed, but increasingly becoming the standard for all products.

Remember: This is *not* a first-in-first out system. The Hot Start Conditioner guarantees the pre-set temperature from the very first kilogram. After the hot start function this machine is operating as a normal one-shaft conditioner.

The latest Hot Starter Conditioner from PTN is more hygienic, there is no rest product left, and thanks to the frequency controller you can empty the machine more efficiently.



6. Retention Time Barrel

-  Depends on output temp of the conditioner
-  1-6 minutes for feed (up to 10 minutes for other applications)
-  Guaranteed first-in, first-out. Advice: combine with a Hot Start Conditioner


When should you use it? Because of its longer retention time, the Retention Time Barrel is ideal for hygienizing your feed formulation in a pelleting line or in a mash feed line (the set-up seen here is combined with a hot start conditioner on top).

Remember: Hygienization requires a temperature above 85°C and a minimum retention time of 3 to 4 minutes. For a hygienization line, remember to trace and insulate the equipment from the feeder until the cooler – this reduces condensation and contamination problems. For hygienizing mash feed, more and more we see a retention time of 6 minutes being requested.

Available in 6 sizes, the PTN Retention Time Barrel achieves 'first in first out' using a special screw that pushes the feed continuously through the barrel. At the end of the shaft a special dosing device takes care of a continuous flow to the next machine - like a pellet mill, Expander or Extruder.



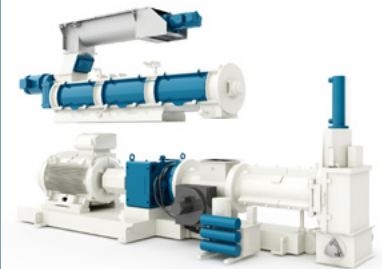
7. BOA Compactor conditioner

-  Max. 105 °C
-  ± 20 seconds
-  8-10% liquids can be added
-  A unique 2-in-1 conditioning and pre-compacting technology




When should you use it? This technology can be used for almost any feed type, but is especially ideal for high-fibre ruminant and horse feed that requires more mechanical shear to pre-compact the feed and make it easier to pelletize.

Remember: For standard conditioning you can only add liquid up to a maximum of 3 to 4% (otherwise the pellet mill is at risk of getting blocked). *But with the BOA Compactor* you can increase this to 8 to 10% - thanks to a unique shearing that pre-compacts and homogenizes the feed.

The BOA Compactor is a unique PTN technology, so called because, like the snake, it eats almost everything – which means you can use a wider range of raw materials to create a high-quality feed. Furthermore, the machine itself is extremely compact – so a good choice if you have limited space available.



8. The Expander

-  110-130 °C for feed (up to 160 °C for specific applications like by-pass protected protein)
-  ± 20 seconds
-  Always combine with (Hot Start) conditioner and crusher






When should you use it? For pre-compacting challenging raw materials at high temperatures – in order to increase the gelatinization and hygienization of the feed.

Remember: You can also produce Expandate with this technology (in a liquid feeding system for pigs, or for ruminants fed with a mixture of grass silage as part of the Total Mix Ratio). In both cases this could be more cost-effective than pellets.

The Almex Expander is unique in its ability to condition and hygienize feed at temperatures up to 130°C, with more mechanical friction. It changes the cell structure of the feed to create a product that is better for the animal to digest; and it kills Salmonella and bacteria without damaging all the vitamins inside the feed, thanks to High Temperature and pressure achieved in a Short Time (HTST).

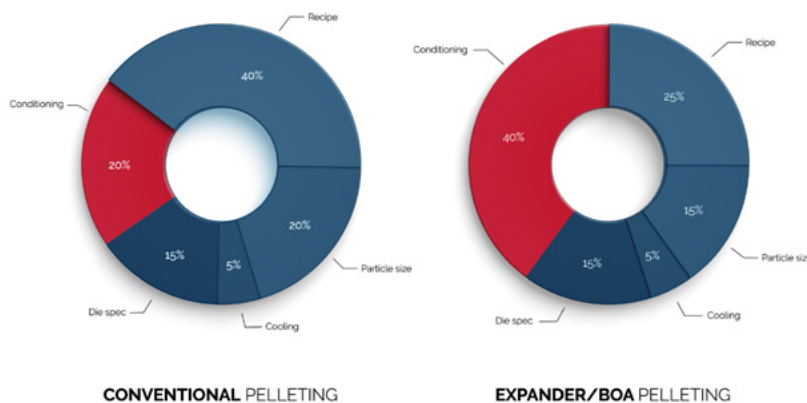
What influences the retention time?

The retention time of a conditioner is influenced by:

-  **The diameter of the conditioning unit:** The bigger the diameter, the more product can fit inside, which results in a higher retention time.
-  **The length of the conditioning unit:** The longer the conditioner, the more product can fit inside, which results in a higher retention time.
-  **The angle of the paddles:** By changing the angle it's possible to increase retention time.
-  **The shape of the paddles:** The less surface they have, the more filling degree can be created, which results in a higher retention time.
-  **Rotation speed of the shaft:** A lower shaft speed creates less transport in the conditioner. So, the filling degree and retention time will increase. (To change the speed of the shaft, a frequency controller is needed).

For a full explanation you can rewatch the FeedForward episode [here](#).

The true value of pre-conditioning technologies



The contribution towards pellet durability of conventional pelleting and of Expander equipment with its extended range of process variables: (After Behnke, 1995)

Here we can see the value of pre-conditioning technologies like the BOA Compactor and Expander.

- The quality of feed undergoing conventional conditioning (left) is 40% dependent on the formulation – or raw materials.
- But for feed that has been treated with the BOA Compactor or Expander that figure nearly halves to 25%.

So, if you are working with challenging or inconsistent raw materials, these are technologies you should seriously consider.

Putting conditioning to the test

We've outlined the different conditioning set-ups and when best to use them. But that's not all.

We can also work with you *to put these different technologies to the test*.

The Triott Group works closely with several well-known third-party research partners, including [the Feed Design Lab \(FDL\)](#), [the IFF-Braunschweig](#), [Wageningen University](#), and [ZETADEC](#).

Through our continuing work with these leading thinkers, we offer our customers the opportunity to run small-and-medium-scale conditioning tests under laboratory conditions.

- You can experiment with different conditioning set-ups and parameters before making a major investment.
- The testing facilities are contamination-free (and of course don't interfere with your daily production).
- Experts are on hand to help you gain a better understanding of the product you produce, the technology involved – and how to measure and improve.

If that sounds like an interesting option, we would love to hear from you.

Looking for further guidance on conditioning?

We hope you've found this brief guide useful. Ultimately, when it comes to conditioning, there is no 'one-size-fits-all' solution. Your ability to create the optimum product at the optimum price and capacity will always depend on the unique demands of your customer, their animals and the formulation.

Here at the Triott Group, we have the expertise and track record to help you make those decisions – and ensure that you get the very most value from your conditioning set-up. So, if you have any questions or requests, please do not hesitate to get in touch.

Get in touch

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Finally, happy conditioning!

PTN, Almex and IVS are part of the Triott Group, a 110-year-old, family-run (privately held) business comprising complementary companies serving the global feed and food industry: Ottevanger (milling engineers); Inteqnion (process improvers); PCE (Pelleting Consumables Europe); and TSC (Top Silo Constructions). Together they have the capability to provide all (or any) elements of a turnkey milling solution, from storage, handling, dosing, milling & mixing solution to pelleting extrusion and complete plant management.

