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Aquafeeds

Water stability, texture of shrimp feeds formulated with natural, synthetic binders

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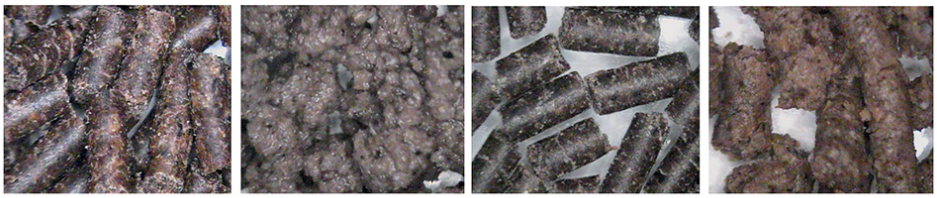
Feeds with a synthetic binder had the highest water stability, followed by kelp meal



Control Feed (No Binder) | After 30 Minutes in Water | Feed With Synthetic Binder | After 30 Minutes in Water

The control feed displayed adequate water stability, but was improved by the addition of natural binders. The synthetic binder reduced dry matter loss to 2.6 percent.

The water stability of aquatic feeds is affected by ingredients and manufacturing parameters. Among available ingredients, the source of carbohydrate and type of binder used probably have the most influence on pellet water stability. Synthetic and natural binders that provide increased water stability are often used without consideration of the final dry or wet pellet texture.

A recent study evaluated the pellet water stability and texture of four shrimp feeds manufactured using two natural binders (wheat gluten and kelp meal), one synthetic binder (Pegabind®), and a control with no binder. All feeds contained equal amounts of wheat flour as a carbohydrate source.

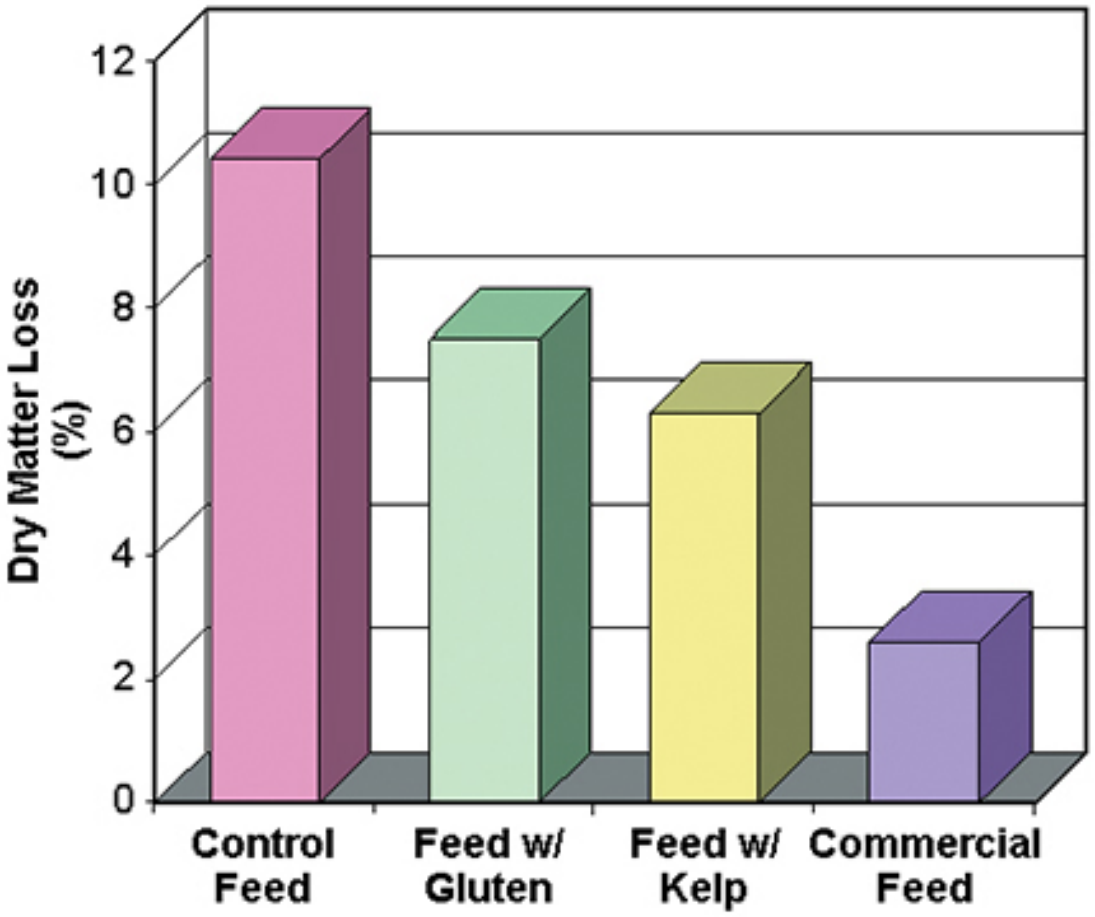


Fig. 1: Leaching of dry matter after immersion of experimental feed pellets in seawater.

Feed preparation

A control feed with no binders added, and three feeds containing wheat gluten at 0.3 percent, *Macrocystis pyrifera* kelp meal at 3.5 percent, and a synthetic binder at 0.6 percent inclusion were manufactured in a commercial feed mill in Guayaquil, Ecuador. Table 1 shows the proximate composition of the experimental feeds.

All feeds contained 28 percent crude protein and were formulated with ingredients commonly used by the industry in Ecuador, including fish meal, wheat middlings, whole wheat meal, rice polishing, fish oil, soy lecithin, vitamins, and minerals. The ingredient mixes were ground so that 65 percent of the particles were smaller than 250 µm. The feed mashes were preconditioned for 60 seconds and pelletized at 95 degrees-C.

Feed characteristics

Dry matter loss and protein loss after one-hour immersion in 28 degrees-C seawater, and water absorption capacity were determined for pellets following standardized techniques at the Universidad Autónoma de Nuevo León Mariculture Program in Nuevo León, Mexico. The hardness, fracturability and cohesiveness of dry pellets were evaluated using a texture analyzer at the Oceanic Institute in Hawaii, USA.

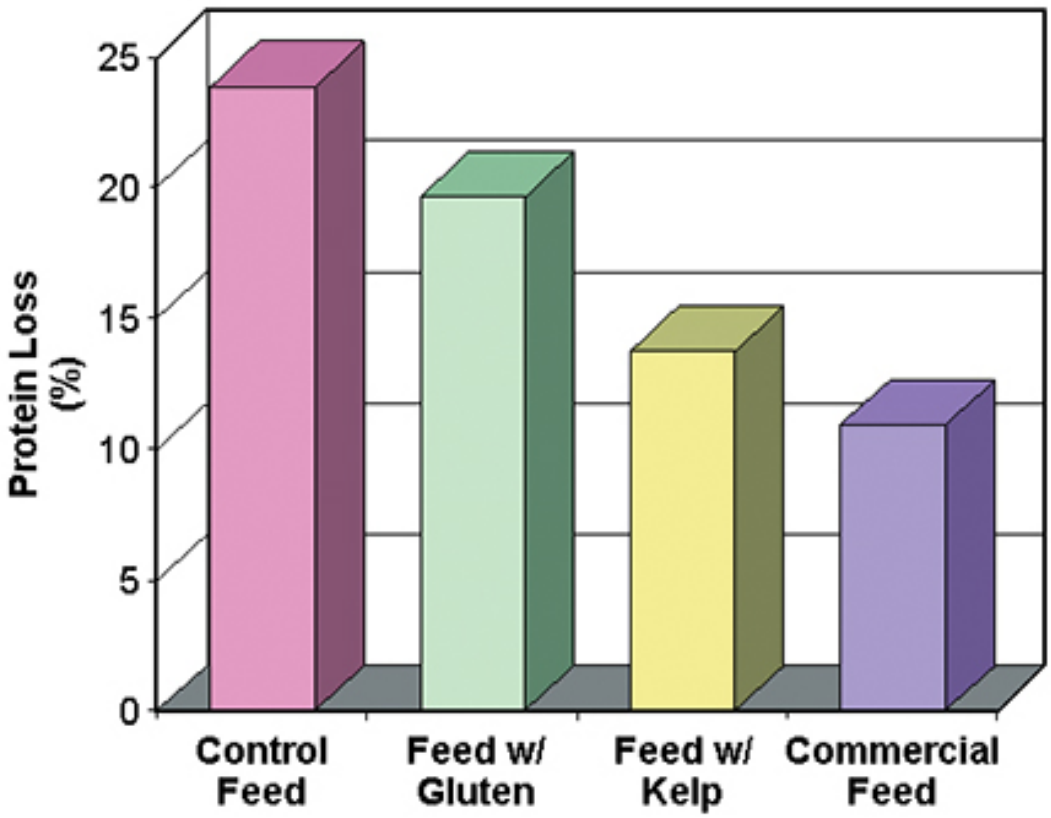


Fig. 2: Leaching of protein after immersion of experimental feed pellets in seawater.

Results

Water stability

In spite of the adequate water stability of the control feed (dry matter loss = 10.4 percent), significant improvements were observed with the addition of wheat gluten and kelp meal (Fig. 1). The synthetic binder reduced dry matter loss to 2.6 percent. Feed protein losses had the same pattern (Fig. 2).

Water absorption capacity

The control and feeds with wheat gluten, and kelp meal presented significantly higher water-absorption capacities than the feed with the synthetic binder. The inclusion of the natural binders probably produced a softer texture in these feeds when immersed in water.

Hardness, fracturability, cohesiveness

Feed pellets containing kelp meal had the highest hardness and fracturability in the test. Pellet cohesiveness was not significantly different among feeds. It is recommended that pellet cohesiveness be measured after feeds have been immersed in water for 30 minutes.

Conclusion

In a test of feeds with natural and synthetic binders, the feed with a synthetic binder had the highest water stability, followed by feed with kelp meal. However, water absorption capacity was reduced in pellets with the synthetic binder. Pellets containing kelp meal showed greater hardness, fracturability, and cohesiveness than the other feeds, but this did not affect water stability.

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