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INTERVIEW: Genetics are the Missing Link in Insect Supply Chain—Beta Bugs

As the insect feed sector scales up and professionalises, there is a space opening up within that supply chain for companies to specialize not in the production of insects, but in supplying the companies who will themselves produce the insects.

One such company is UK startup Beta Bugs, one of a very few operations worldwide specializing in the genetics of insects destined for feed. Founded by Dr. Thomas Farrugia in 2017, the company is working on breeding an improved Black Soldier Fly. Its flagship product is the HiPer-Fly, which can offer better yields; Beta Bugs asserts on its website that it, with regular infusions of fresh stock as it constantly improves BSF strains “every year you benefit from using our strains will give you a minimum of a 2% increase in productivity”. In the future, the company may add products which optimise nutritional characteristics that might be desired by different feed sectors, for example adjusting the crude protein or crude fat levels, and maybe even boosting the levels of Omega 3 fatty acids for the aquaculture market.

In November 2020, Beta Bugs moved into the production facility it calls its “nucleus”, located at the University of Edinburgh’s Easter Bush campus in Midlothian, just outside the Scottish capital. Production will



Dr. Thomas Farrugia

Founder

Beta Bugs

eventually be scaled up from what is currently possible at that site, but of course, as Dr. Farrugia points out, “in genetics you don’t need a very large population to do the breeding and the improvements, and that’s the bit we’re working on currently...the main focus for the company at the moment has been on making a better breed, so in effect the genetics. As a result, the facility doesn’t need to be focused on the scale up in production immediately.”

Instead, the company is dedicating its resources to addressing the many puzzles inherent in breeding such a unique species. In Dr. Farrugia’s view, some of these present both challenges and potential benefits. For example, he says, it is a benefit to have a very short lifecycle, as a genetics program can quickly yield results; however, the short life cycles can also be tricky, because you “need to be able to keep in lockstep with your selections and your breeding program.”

Similarly, the Black Soldier Fly is relatively undomesticated, meaning that there are fewer different genetic lines already identified and documented. And of course, the animals are tiny! “You’ve got much smaller livestock to work with, which becomes challenging when collecting phenotypes.” However, he says, “building the right kind of infrastructure...allows you to really track your genetic progress along multiple lines and individuals as well, and really [get] into the resolution of the data.”

Here, he points out, the small size of a dedicated breeding operation is an advantage: “If you had a larger Black Soldier Fly facility, it might be challenging to monitor these individuals, so you’re not going to get the same granularity of data.”

On the whole, there is clearly a fair bit of white space for the technical expertise of a specialized insect breeder to fill.

On the commercial front, too, Dr. Farrugia sees opportunities emerging for an insect genetics provider. While some see the future of insect protein in vertical integration, the emergence of more “off the shelf” type of equipment and facilities, is also supporting horizontal segmentation, enabling new market entrants to venture into the world of feed insects without necessarily having the resources to take on the entire insect production lifecycle. From this perspective, Beta Bugs’s dedication to remaining in the insect genetics space rather than venturing further downstream into production means that it can be a trusted supplier and partner to its customers as the sector develops further.

On the flip side, as one of only a few actors specifically focused on this stage of the insect production supply chain, Beta Bugs is obliged to keep an eye on developing regulation and ensure that the unique interests and constraints of an insect breeder are not entirely forgotten as the rules are built around the more common experience of the insect protein producer. For example, he points out that requirements on what kind of substrate insects may be fed on might not be taking into account the fact that his Black Soldier Flies are several generations away from being included in feed. “Does the whole supply chain need to be reared on the same foodstuffs, like [feed-grade] substrates?” he queries, hypothetically. “Because at the moment [regulation] is all kind of based on this vertical approach, where everything happens in one facility.”

However, for the most part, Dr. Farrugia's focus is on more immediate goals. Over the last 18 months the company has secured £133k of private investment, along with £1.2m in grant funding, and is participating in a consortium aimed at helping the UK develop a complete waste-to-insect-to-feed chain. Now, he says, "it's really all about making 2021 the year of the bug; this is, breeding program and bringing the product to market." Still, this should not be interpreted as a sign of modest ambitions. Dr. Farrugia says there is no reason why a UK-based Black Soldier Fly genetics supplier should be limited to supplying only those insect protein producers in its region. "Genetics has a history of being scalable... when the markets consolidate you can get market shares of up to 50% in poultry, etc." he observes. "We see [insect genetics] as a global business... you need to go global, then you will tune your breeds to different areas and market needs."