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Flour From Drone Broods: A Viable Alternative?

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Abstract

Many insects and products derivate from them have been suggested as food or food ingredient. This work aims to enhance a natural resource, brood (pupae and larvae) drones not used by honey producers. Drones are present in the hive mainly for reproduction purposes, but beekeepers may use the technique of removing the drone frames to combat and control the Varroa destructor mite, because this parasite prefers laying its eggs in the drone larvae that is bigger than the worker larvae. However, the brood drone removed is not valued, and despite the effect on reducing varroa populations, usually beekeepers will consider its removal a loss, especially if it contributes to reducing the honey and other bee products. We aim to study and valorise the drone pupae and larvae as an alternative food source, through simple and viable extraction techniques that producers might adopt. The extraction yields of drones from the wax frames were 84.9±4.0% and 62.5±7.5%, respectively, for hot and cold surface extraction. Extraction on the cold surface proved to be more time efficient, taking 246.8±30.1 seconds to extract 100 g of broods. Larvae and pupae were subjected to two types of drying: steaming and freeze-drying. Steaming darkened the larvae and pupae too much, and the broods were too soft and not possible to transform into flour. Thus, this process did not prove to be a good drying process and was rejected. In opposition, freeze-drying (to constant weight) gave better results. Thus, both hot and cold extracted broods were submitted to this drying process to be later milled to obtain flour. Flours obtained from the hot extraction had a darker and more yellow colour (L* 60.6±1.0; a*2.5±0.2; b*29.4±0.4), while flours produced from the cold extracted samples had a lighter and less yellow colour (L*85.6±1.3; a* -1.9±0.2; b*18.3±0.6). It was found that the hot extraction method removed some protein, mineral elements, and sugars, showing a high fat content, 44.89±0.04%. The flour produced from cold extracted drone broods had a protein content of 38.67±0,07, fat 25.73±0.03, total sugars 10.80±0,55, total ash 3.18±0,03, and fibre 4.47±0.22. The use of these flours was also tested to produce some foods: biscuits, crackers, bread and pasta. In these tests, the percentage of substitution of wheat flour by drone broods varied between 10% and 30%, depending on the type of product and the type of flour that was used. Thus, this new product, in addition to bringing nutritional benefits to consumers, may also provide an increase in income for

the beekeepers, proving to be a sustainable product.

Keywords: drones brood, extraction methods, dehydration, flour production, flour applications

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