



BEE SCIENCE
NUTRITION

By



Testing the palatability of some protein supplements administered in honeybee supplementary feeding late in winter

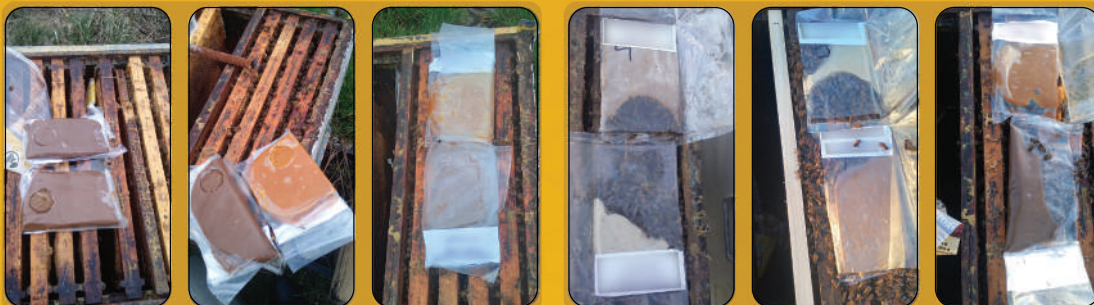
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ABSTRACT:

In the production of nutritional supplements based on pollen substitutes, there are often problems related to attractiveness and consumption, even if their composition responds to the nutritional requirements of honeybees. Attractive substances (e.g. volatile oils) but also the ratio of proteins to carbohydrates can influence consumption. As a result, carbohydrate-protein formulas based on pollen substitution require palatability testing, a property that reflects the degree of their attractiveness and consumption. Since there are various protein ingredients on market, simple (e.g. soybean flour), in mix (products with more ingredients) or ready to use (protein candy or patties), beekeepers can test the palatability of various formulas for personal use.

Materials & Methodology:

In order to support these evaluations, a rapid comparative test was developed for several formulas (4 home-made formulas based on protein substitutes including a home-made formula based on monofloral pollen with 23% crude protein, 4 ready to use protein products of the patty type). The carried-out tests took into account the application of some standardization principles for experimental purposes: use of the same carbohydrate base, equivalence of the protein percentage, equality in the administered quantity and equality in contact surface with the honeybee's cluster. The experiment was carried out on 24 colonies divided into groups of 3 colonies/group, standardized as bees intervals and brood surface, in February (2023) in order to benefit from protein "hunger", a natural physiological state in this year period. For the comparative testing, we applied a comparison method in pairs of two different patties (250 grams/patty) placed similarly above the wintering cluster on each experimental colony. Patty consumption was evaluated after 5 days of administration.

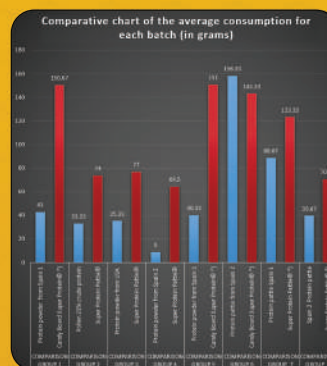


Results:

Following this test, variable results were obtained with maximum of 158 g consumed product (commercial patty) and a minimum of 9 g (home-made formula, equally with a ready-to-use formula). The pollen-based products recorded an average consumption of 33 grams. By comparing several and different formulas in pairs under the same experimental conditions, with the evaluation of the consumed quantity before complete consumption, it is possible to quickly assess the palatability degree of protein formulas, in protein necessity conditions generated by brood rearing for wintering bee replacement.

Table 1: Comparison table results from study

Experimental group	Product	Product type	Total crude protein in final product	Mean consumption in 5 days (in grams)	Relative frequency of consumption	Difference between percentage of consumption
COMPARISON GROUP 1	Pollen powder from Spain 1	Raw material (pollen substitute) for bees	5.75%	43.00	17.20	-43.07
	Candy Board Super Protein®	Commercial product Romania	5.75%	150.67	60.27	43.07
COMPARISON GROUP 2	Pollen 23% crude protein	Dehydrated pollen	12.5%	33.33	13.33	-16.27
	Super Protein Pattie®	Commercial product Romania	12.5%	74.00	29.60	16.27
COMPARISON GROUP 3	Pollen powder from USA	Raw material (pollen substitute) for bees	12.5%	35.33	14.13	-16.67
	Super Protein Pattie®	Commercial product Romania	12.5%	77.00	30.80	16.67
COMPARISON GROUP 4	Pollen powder from Spain 1	Raw material (pollen substitute) for bees	12.5%	9.00	3.60	-22.20
	Super Protein Pattie®	Commercial product Romania	12.5%	64.30	25.80	22.20
COMPARISON GROUP 5	Protein candy from Spain 2	Raw material (pollen substitute) for bees	5%	40.33	16.13	-44.27
	Candy Board Super Protein®	Commercial product Romania	5%	151.00	60.40	44.27
COMPARISON GROUP 6	Pollen candy from Spain 2	Commercial product Romania	3%	156.33	63.33	6.00
	Candy Board Super Protein®	Commercial product Romania	3%	143.33	57.33	-6.00
COMPARISON GROUP 7	Pollen patty Spain 1	Commercial product Romania	16.3%	86.67	35.47	-13.67
	Super Protein Pattie®	Commercial product Romania	16.3%	123.33	49.33	13.67
COMPARISON GROUP 8	Pollen patty Spain 2	Commercial product Romania	10%	39.67	15.87	-12.40
	Super Protein Pattie®	Commercial product Romania	10%	70.67	28.27	12.40



Conclusions:

By adhering to the principles outlined in the Materials and Methods section, most beekeepers can test the palatability of commercially available products through an accessible and relatively simple method, yielding results that are both statistically and scientifically conclusive, as well as relevant for beekeeping practice. In all protein content variants, the products from Dulcofruct Bee Nutrition Science outperformed competing products in terms of palatability, with only one exception, which we will mention.

The product Candy Board Super Protein® outperformed all competing products, except for the product in experimental group 6, which recorded a consumption 6% higher than Candy Board Super Protein®, adjusted to the 3% level—this difference being justifiable due to the consistency difference. The competing product had a softer consistency, which makes it more attractive for consumption by the bees.

We consider that products with less than 8% protein content do not meet the physiological requirements of the bee colony for a balanced protein supply and can only be used as a protein supplement feed in the presence of other natural protein sources, not as the primary source of protein.

Additionally, the product Super Protein Pattie® was more palatable than any competitor, although it showed slightly lower palatability than Candy Board Super Protein®, a difference attributed to variations in composition, including protein content (10.5% crude protein vs. 12.5% crude protein).



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