

# Effect of a liquid diet with protein, vitamins and probiotic on honey production and winter survival in *Apis mellifera iberica* and *Apis mellifera ligustica* honey bees

Pedro Díaz Molins<sup>1</sup>, Antonio Martínez Mateo<sup>1</sup>, Raffaele Dall'Olio<sup>2</sup>, José Serrano Marino<sup>3</sup>

<sup>1</sup> Zukan S.L.U. (Spain) <sup>2</sup> BeeSources, beekeeping consultancy, Bologna (Italy) <sup>3</sup> Zoology Department. Faculty of Veterinary. University of Murcia. (Spain) jserrano@um.es

## INTRODUCTION

The objective was to evaluate the effect of a new liquid feeding with 2% of protein, vitamins and probiotics on the weight of hives and honey production, in managed Iberian and Italian honey bees.

## METHODOLOGY



### LOCATIONS

- **Murcia**, Spain (experimental apiary at the University of Murcia).
- **Bologna**, Italy (experimental apiary at BeeSources, Bologna).



### TYPES OF CLIMATE

Average temperature ranged between 12°-26°C in Murcia and 13°-25°C in Bologna.



### TYPE OF BEE

*Apis mellifera iberica* and *Apis mellifera ligustica*, 10 hives in each location, randomly placed.



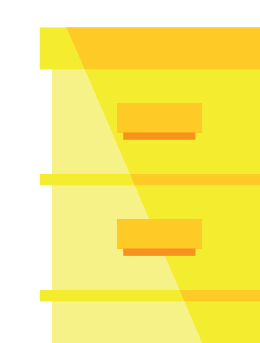
## GROUPS OF HONEY SAMPLES

10 hives at each place were distributed randomly into two groups:



### GROUP 1

5 hives



Control group, no supplementary feed



### GROUP 2

5 hives



### Fed with liquid diet

These were fed each two weeks with liquid diet: enzymatic inverted sugar syrup (75% d.s.), 2% of protein (hydrolyzed yeast), vitamins (B1, B2, B3, B4, B5, B6, C and K) and probiotics (*Bacillus subtilis* and *Enterococcus faecium*).

Starting date of feeding was **8th October 2021** (Bologna) or **5th November 2021** (Murcia) up to **August 2022**.

## RESULTS

Consumption of food was higher in Murcia (10,5 kg/hive) than in Bologna (7,9 kg/hive), possibly because flowering occurred later in Murcia and thus the feeding time was extended. At the end of the experience the weight of the feeding group increased 2.61 kg in Murcia and 0.68 kg in Bologna. These results are in contrast to the weight decrease in the control group of Murcia, 3.55 kg, and in that of Bologna, 0.5 kg. Honey production of the feeding group was higher in Bologna (26.4 kg) than in Murcia (17.4 Kg honey/hive) although the proportional increase was higher in this last apiary (235% versus 64%).



## HONEY PRODUCTION

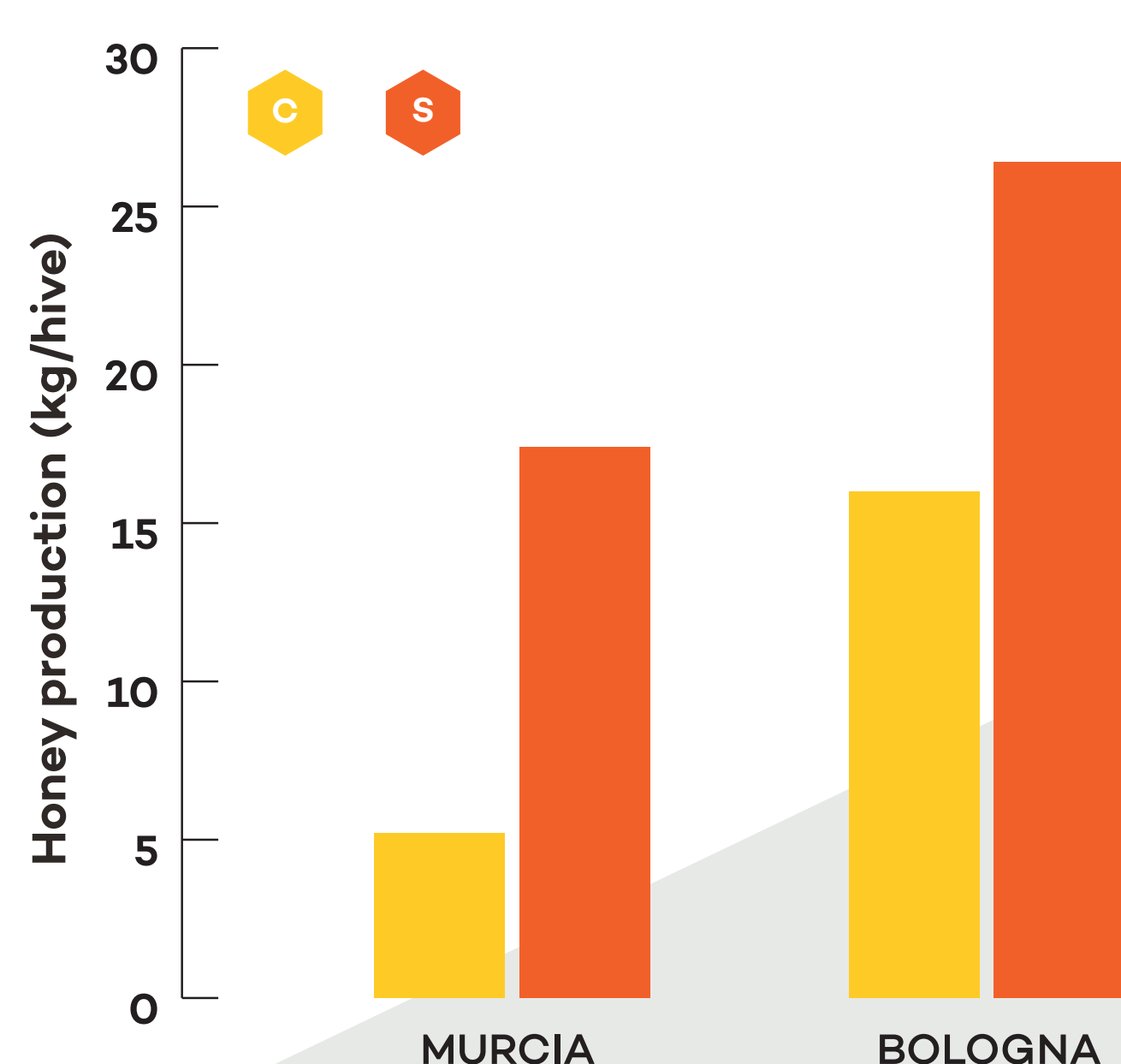


Fig. 1. Honey production in control and feeding groups.



## INCREASED WEIGHT

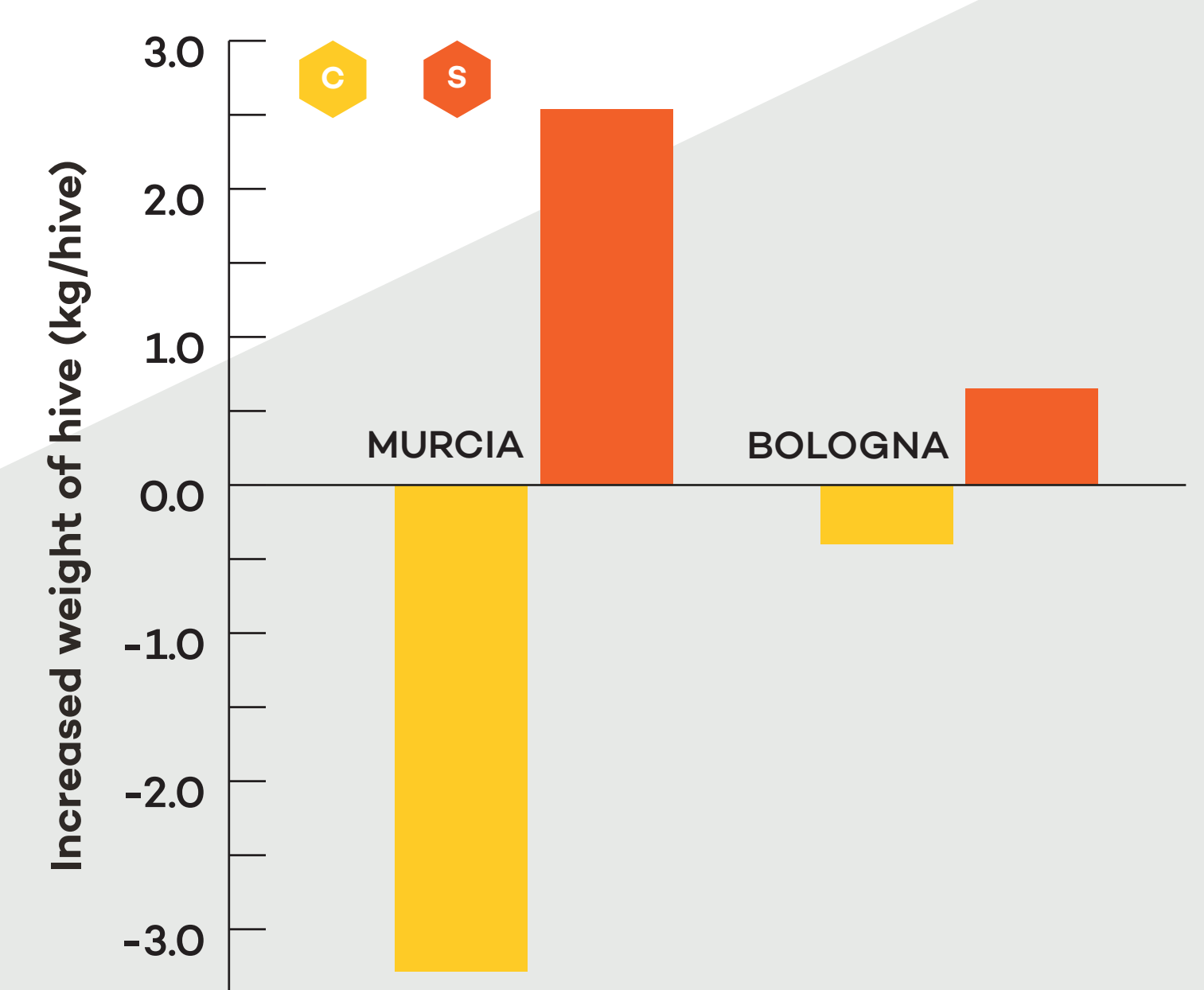


Fig. 2. Increased weight of hive (kg/hive).

## CONCLUSIONS

It is concluded that the liquid diet with protein, vitamins and probiotics is **effective to increase the production of honey and to assure a better hive survival during winter**, when natural resources are almost vanished and weather conditions are hardly favorable.

