



University of Genova

Effectiveness of biomarkers for assessing health and productivity of honey bees

Efficacia dei biomarker per valutare la salute e la produttività delle api da miele

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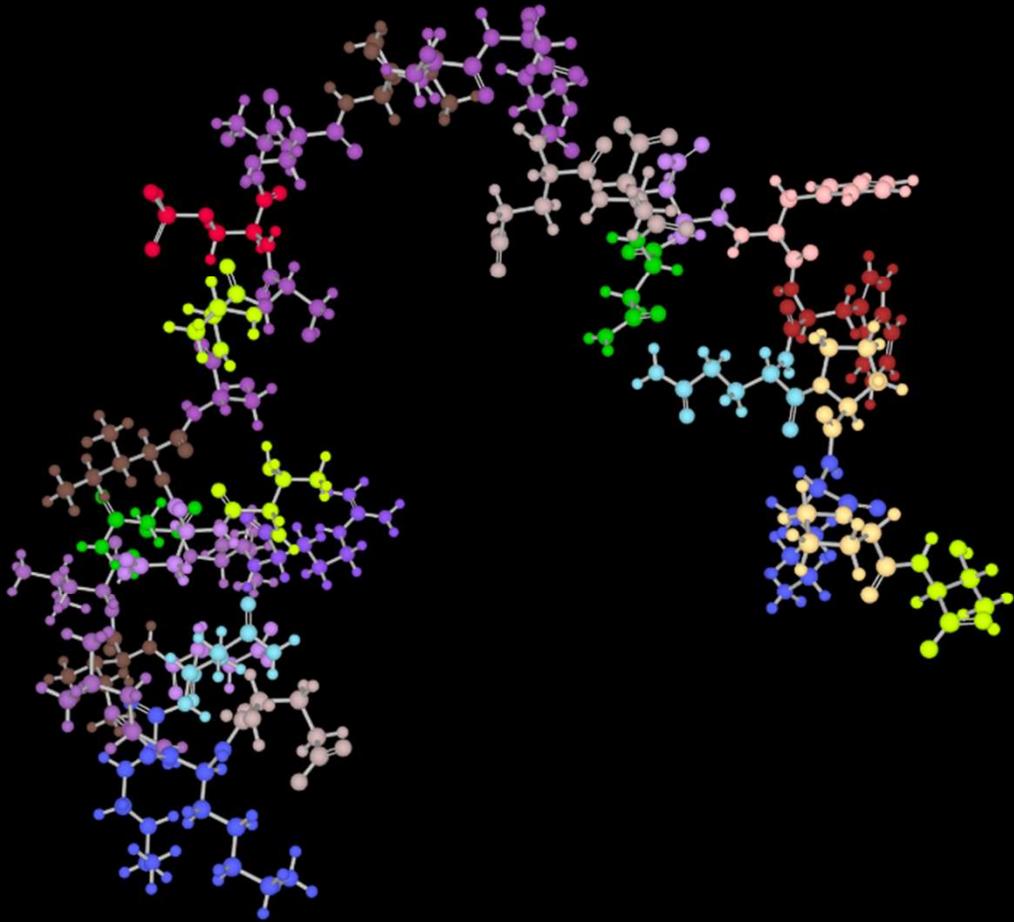
3 INBB, Biostructures and Biosystems National Institute, Roma – ITALY

4 IBF-CNR, Institute of Biophysics of CNR, Genova



We explored the possibility to assess the health of the colony by a measurable parameter





Vitellogenin

Length:1,770 aa

Mass (Da):201,048

Sources: Protein Data Bank; UniProt; InterPro; UniProtKB-KW

Molecular functions:

- **Lipid transporter activity** (Enables the directed movement of lipids into, out of or within a cell, or between cells)
- **Nutrient reservoir activity** (Functions in the storage of nutritious substrates)



For this study, we obtained from
**ASSOCIAZIONE PRODUTTORI AGRIPEMONTE
MIELE**

the bees, object of the investigation.



Dott. Paola Mogliotti, from Asti IZS, coordinated the bees collection.



Bees were from 4 categories:

SN = Nurse Bees from a Strong Hive

WN = Nurse Bees from a Week Hive

SW = Worker Bees from a Strong Hive

WW = Worker Bees from a Week Hive

**Every group was composed
from 10 hives**



Strong hive



- High fly activity
- Large brood
- Young queen (~ 2 months of age)



Weak hive



- Low fly activity
- Low brood
- Queen age < 1 year





Fly activity was considered:

Strong = 60 bees in 30 seconds

Week = > 20 bees in 60 seconds

Harvesting activity was considered:

Strong = 5 bees charged of pollen in 1 minute

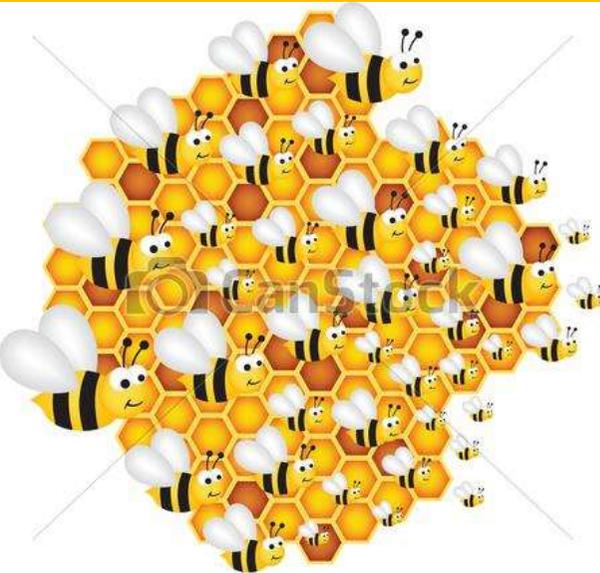
Week = > 2 bees charged of pollen in 1 minute



Brood activity was considered:

Strong = > 7 honeycombs

Week = < 4 honeycombs



Population density was considered :

> 9 honeycombs covered by bees when the beehive is being opened

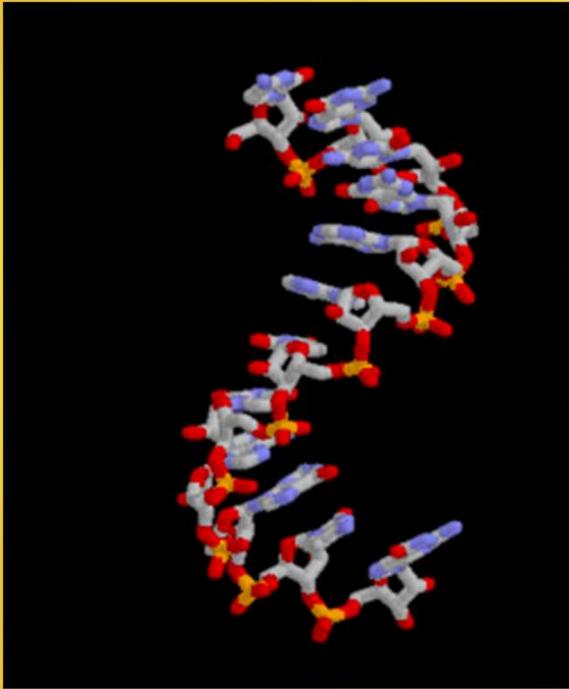
< 6 honeycombs covered by bees when the beehive is being opened

Quantity of stocks was considered:

Strong = > 2 honeycombs

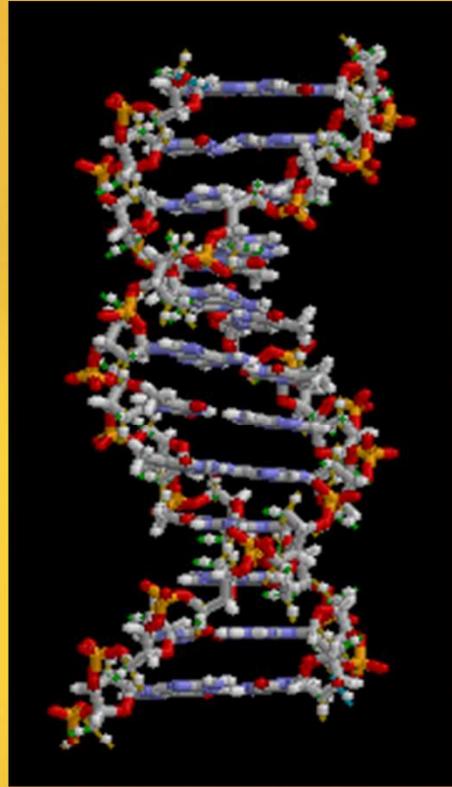
Week = < 1 honeycombs





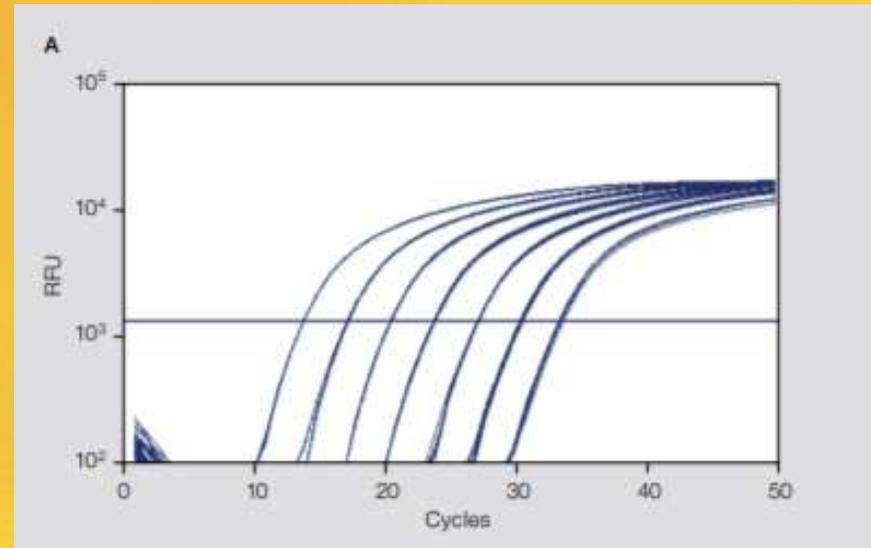
mRNA







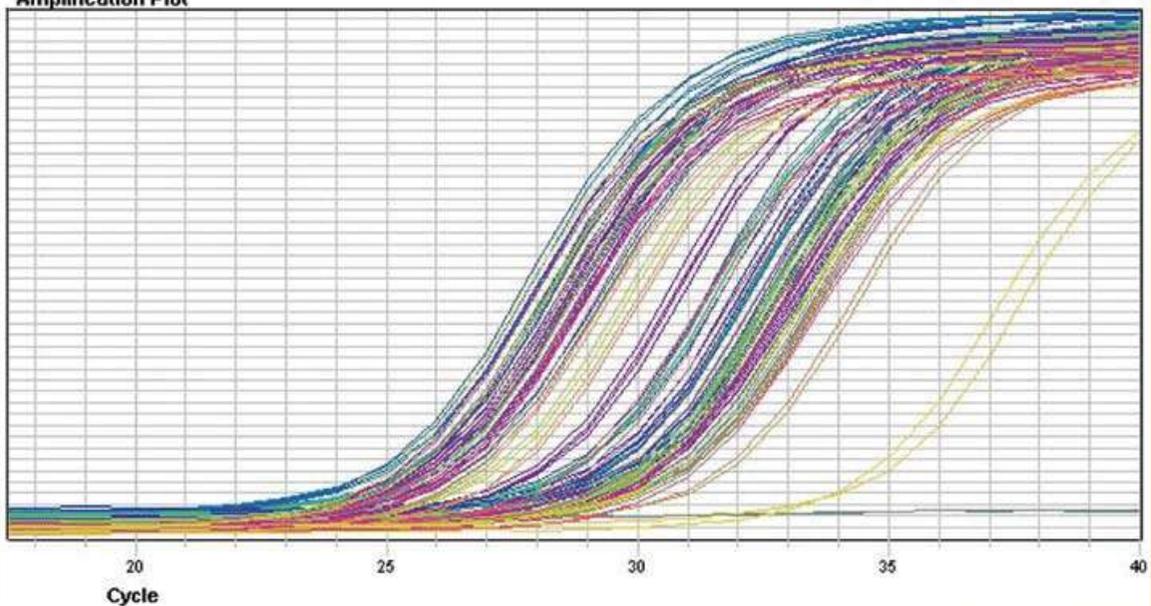
CFX Connect Real-Time PCR Detection System



SYBR GREEN



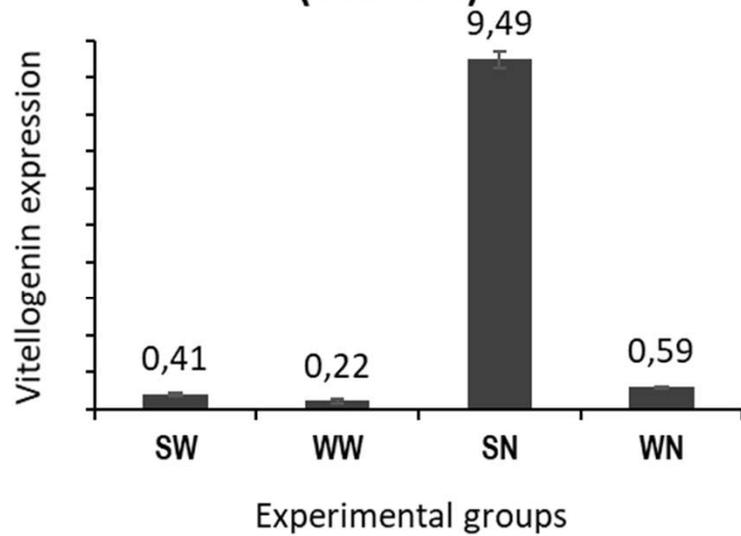
Amplification Plot



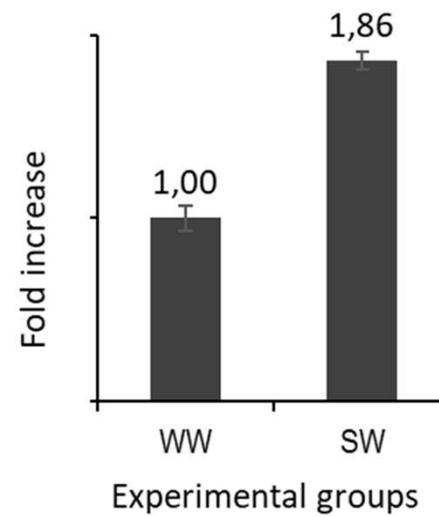
Results

Real Time July 2018

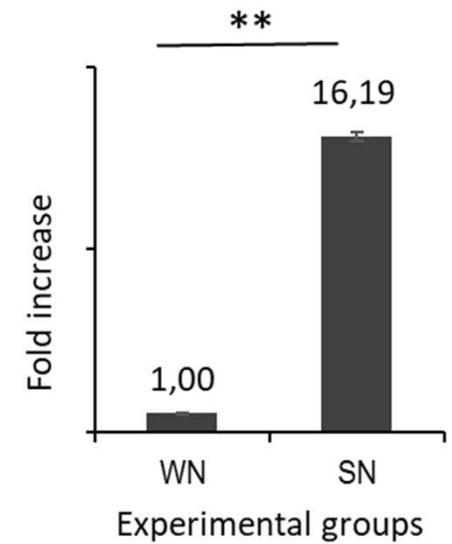
Vitellogenin (HK Actin)



Workers bees



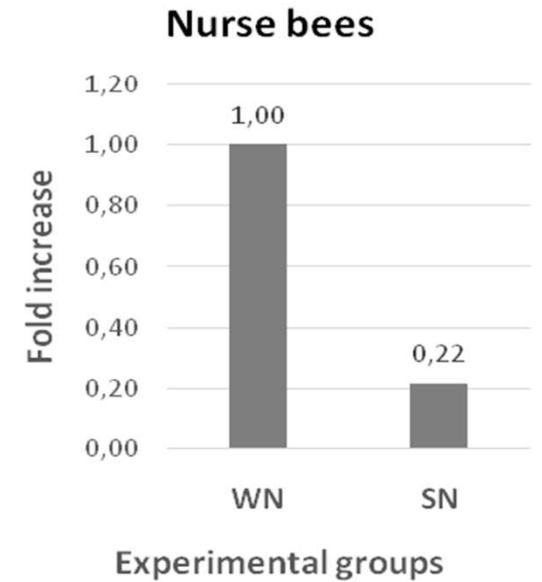
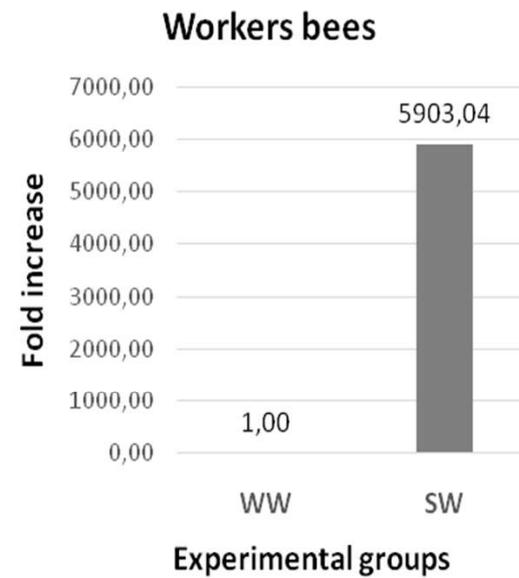
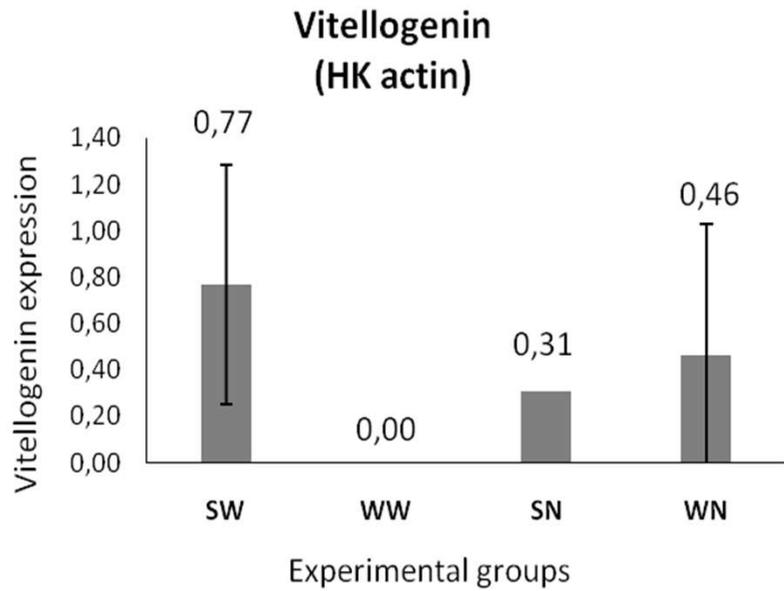
Nurse bees



T test $p < 0.0001$

SN = Nutrici da alveare forte
WN = Nutrici da alveare debole
SW = Bottinatrici da alveare forte
WW = Bottinatrici da alveare debole

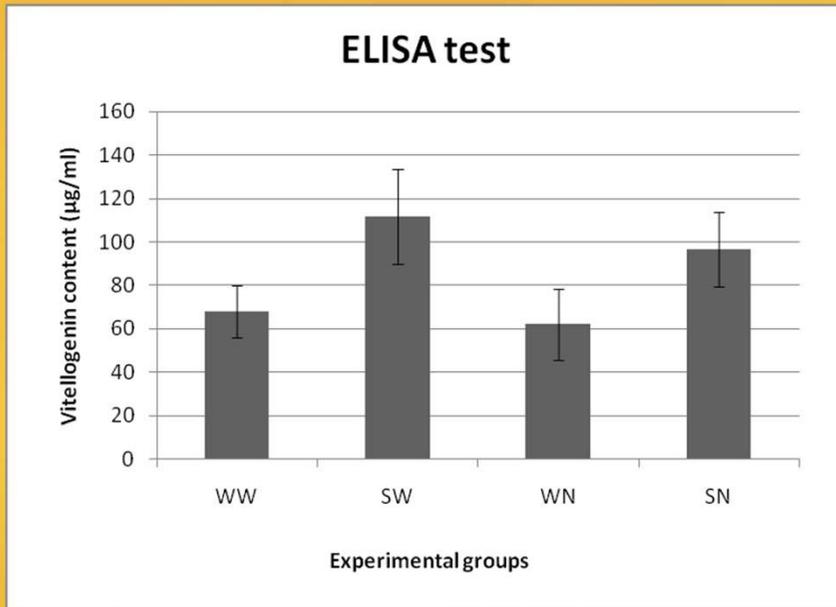
Real Time May 2019



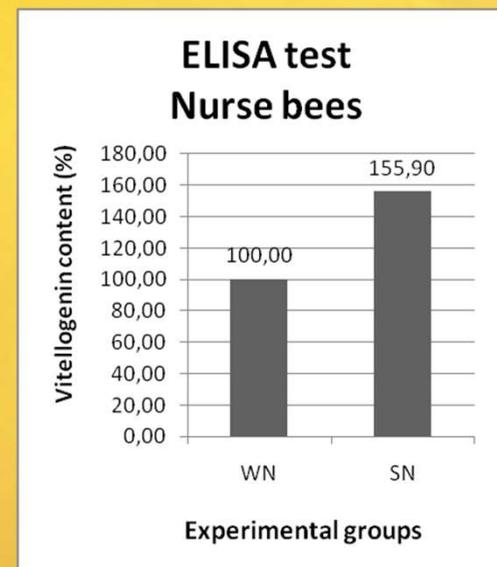
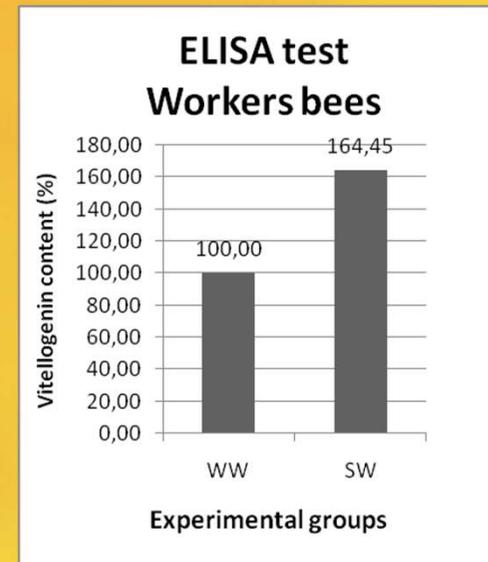
SN = Nutrici da alveare forte
WN = Nutrici da alveare debole
SW = Bottinatrici da alveare forte
WW = Bottinatrici da alveare debole

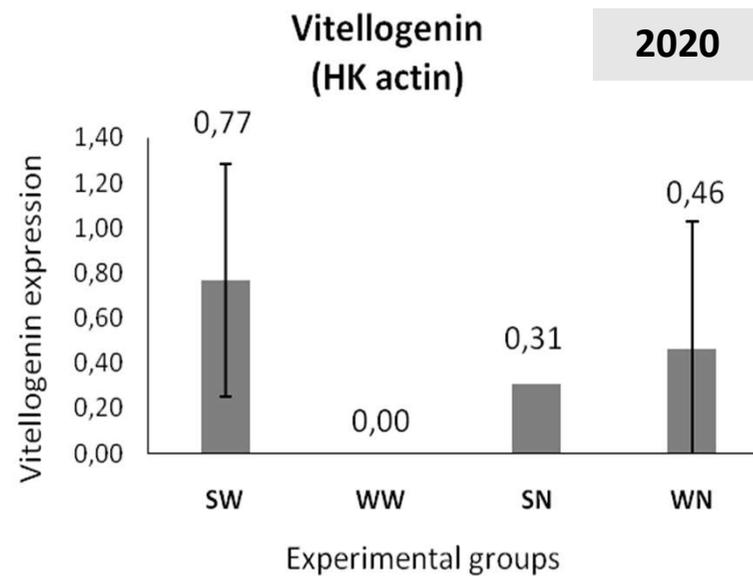
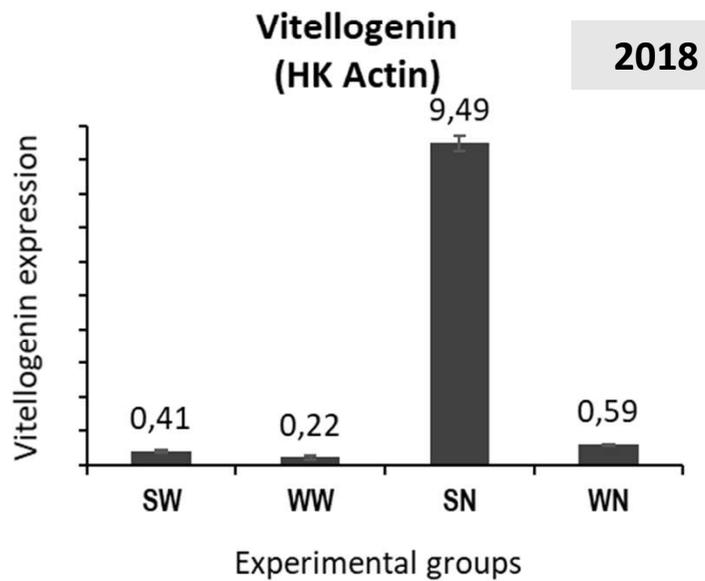


ELISA test May 2019



SN = Nutrici da alveare forte
WN = Nutrici da alveare debole
SW = Bottinatrici da alveare forte
WW = Bottinatrici da alveare debole





SN = Nutrici da alveare forte
WN = Nutrici da alveare debole
SW = Bottinatrici da alveare forte
WW = Bottinatrici da alveare debole



Conclusions

1. Both the strong workers and nurses have vitellogenin in greater concentration of the weak, although absolute values on average are higher in the nurses
2. The vitellogenin concentration gap between the strong and weak nurses is wide in the period between the beginning and half of the operational season
3. For the nurses, at the same time, this gap narrows, showing a opposite trend to that observed in the workers



Thanks to:



Dipartimento di Scienze
Diagnostiche e
Chirurgiche Integrate



