

Laying workers in *Apis cerena* colonies: their induction, behaviour and mitigation

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Introduction

- Laying worker is a common problem in *Apis cerana*.

Situation of queenlessness arises during

- examination of colony when queen falls off
- when virgin queen is lost either during mating flight or in return flight to wrong hive
- When death of queen during transport or predation inside the hive occur.

Generally one would lose about 20% colonies due to laying worker

Present study

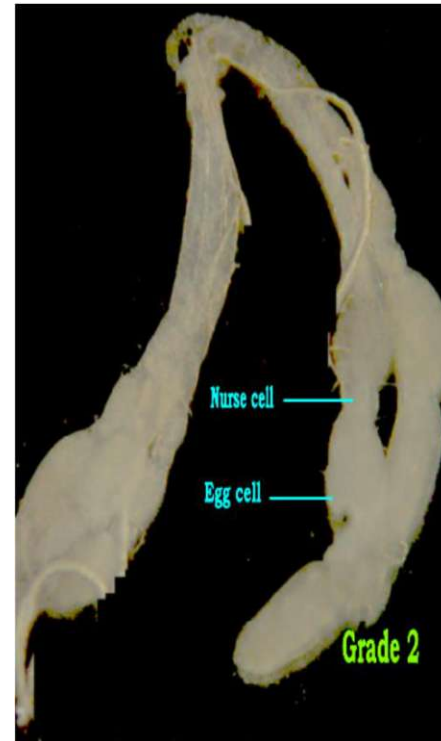
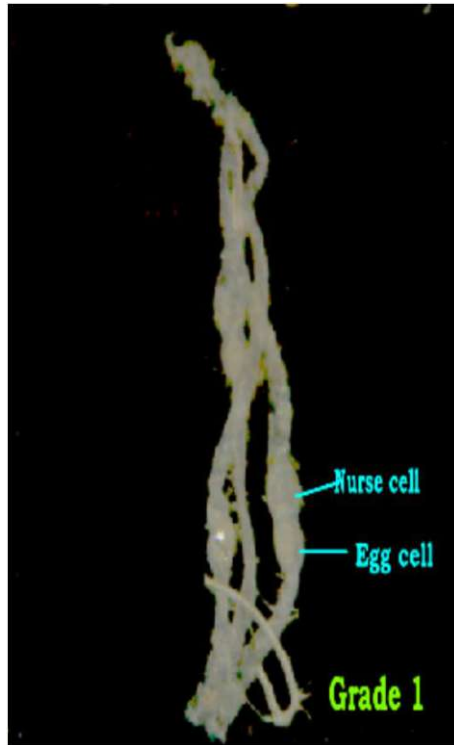
- How among workers, ovarian development takes place after dequeening?
- How age of worker is influencing the ovary development?
- How nutrition is important in worker ovary development?
- How to suppress the worker ovary development?

Methods followed

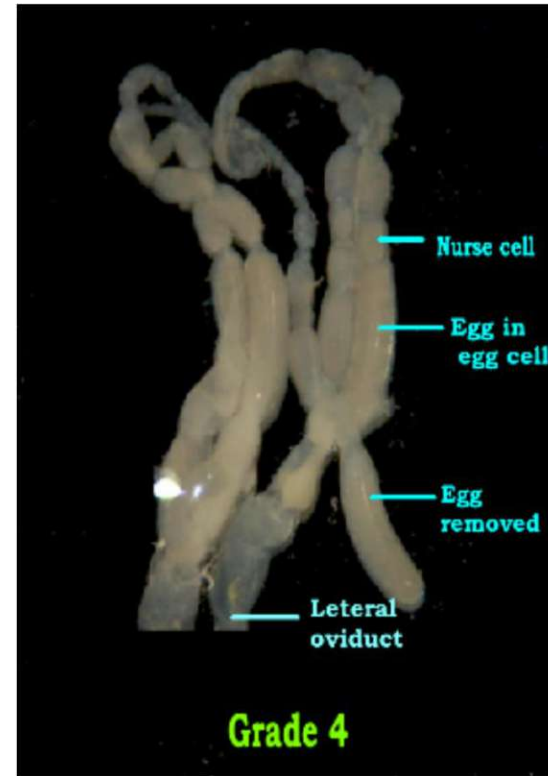
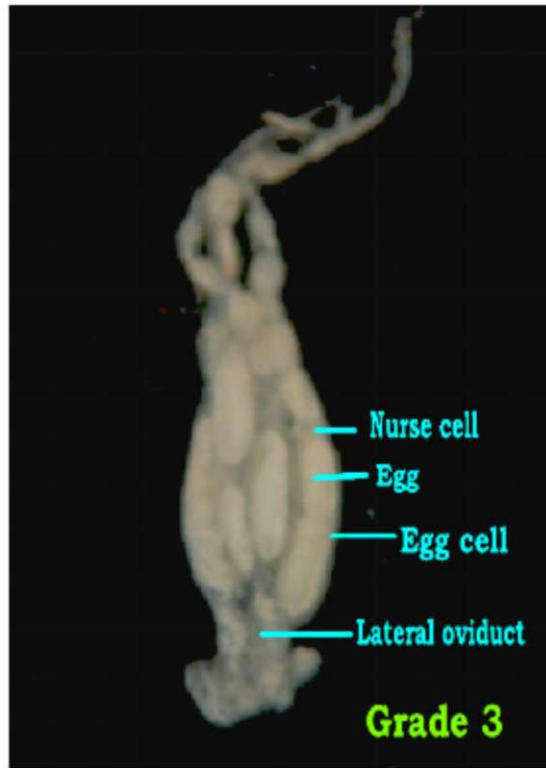
- Dequeening
- Release of newly emerged marked bees from incubated sealed brood.
- Grading of ovaries

GRADING OF OVARIES

- 0:** No ovary development
- 1:** Slight enlargement of ovarioles and oviducts
- 2:** Presence of distinct cells in the ovarioles leading to swellings and constrictions
- 3:** Presence of sausage-shaped cells in ovarioles
- 4:** Presence of fully formed eggs in the ovarioles and oviducts.



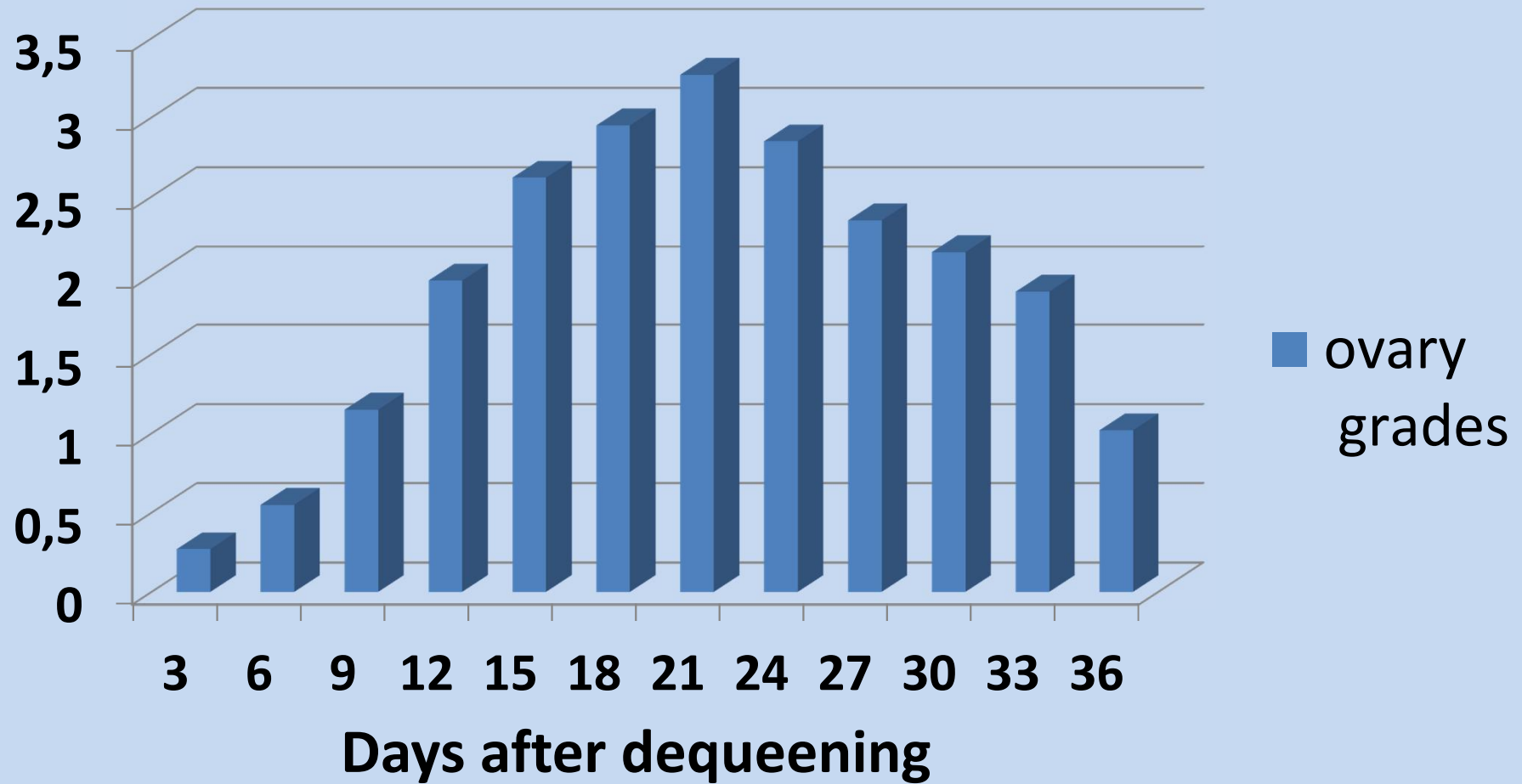
Activated ovaries in Laying worker



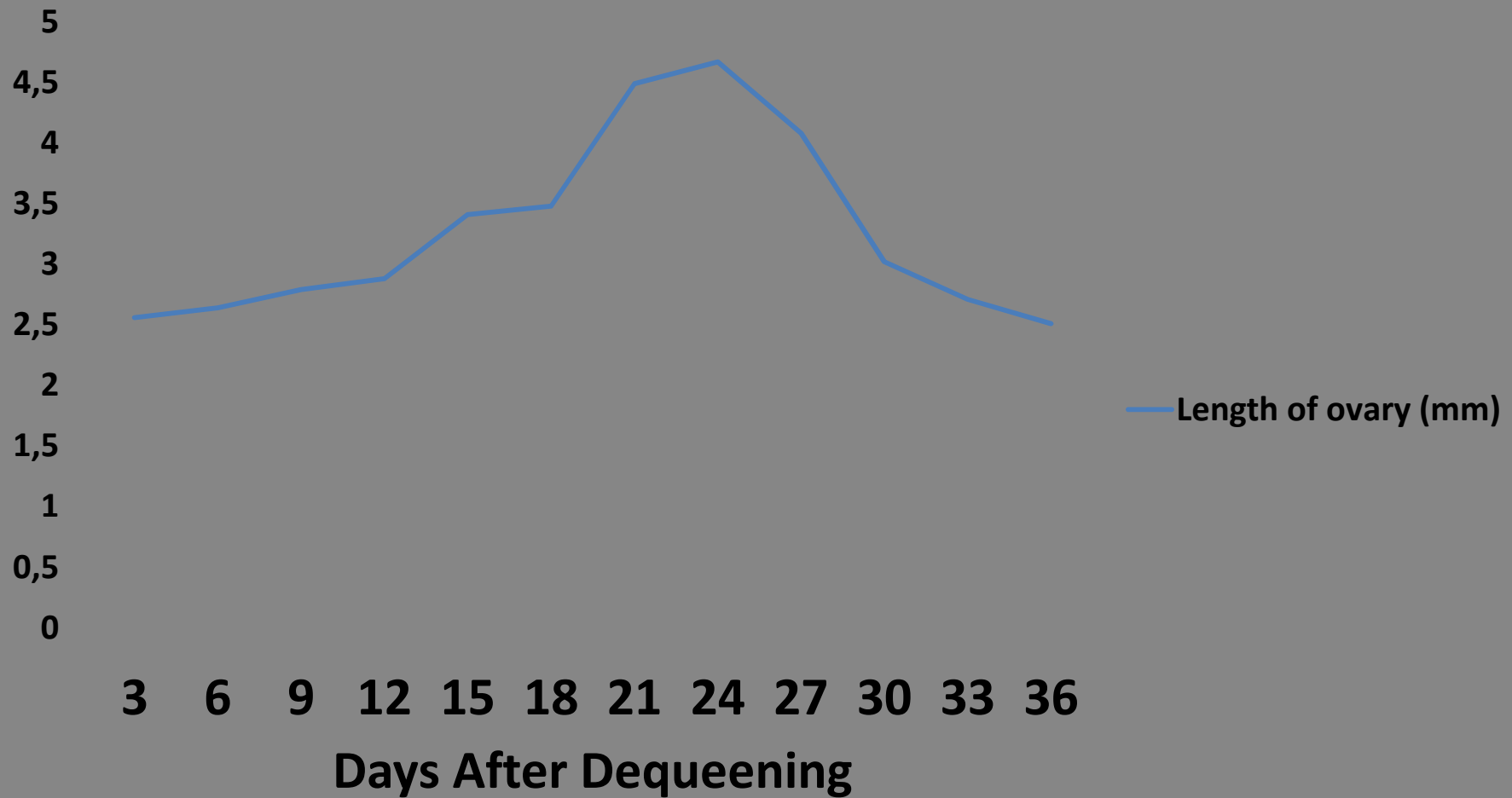
Fully developed ovaries in laying workers

RESULTS

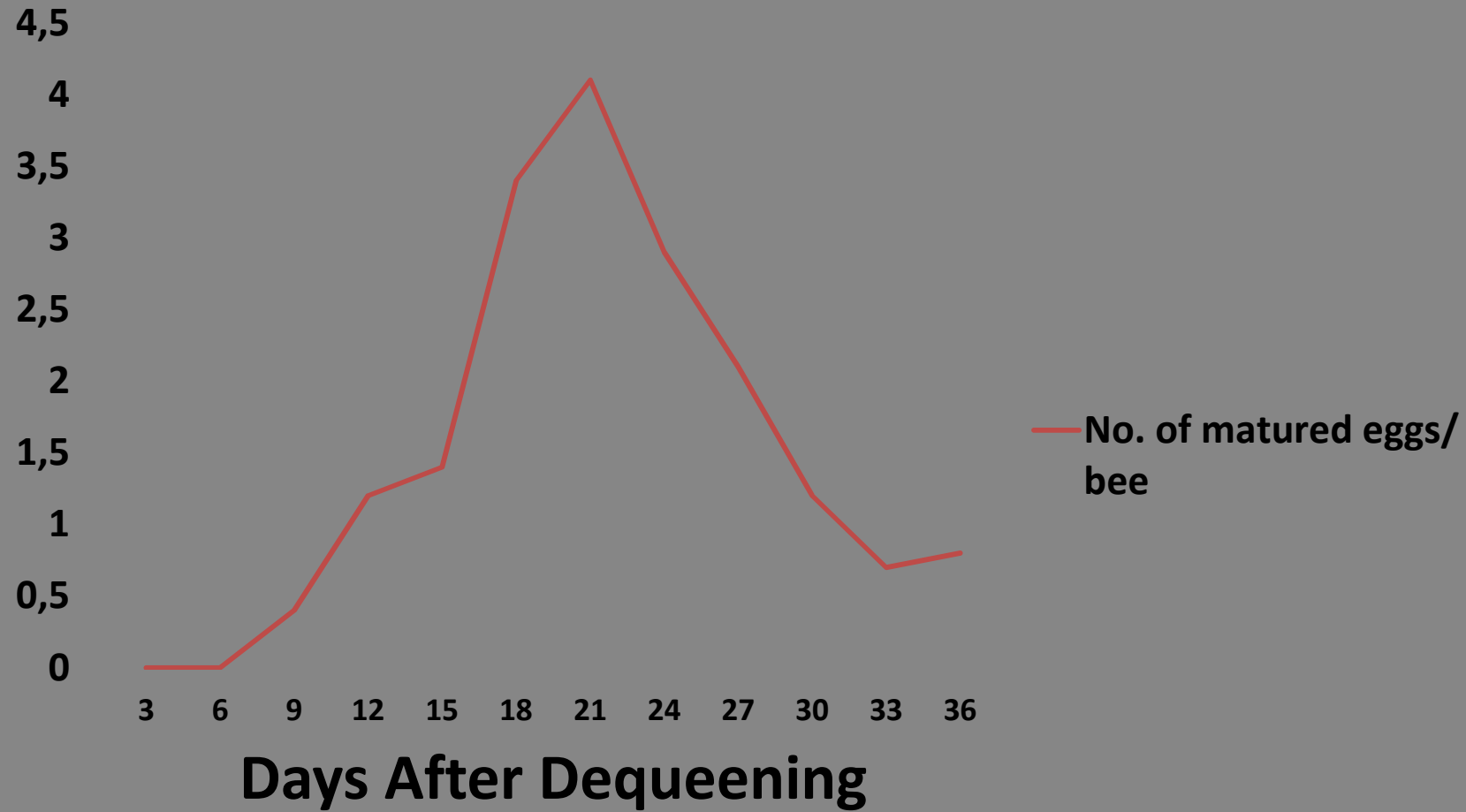
Ovary grades of worker bees in queenless colony after dequeening



Length of ovary (mm)



No. of matured eggs/ bee



Influence of duration of queenlessness on worker ovary development

Days after	Range of Ovary grades	Mean ovary grades	True Layers %
3	0-1	0.27	0
6	0-2	0.55	0
9	0-3	1.15	0
12	0-4	1.97	2.5
15	1-4	2.62	10
18	1-4	2.95	10
21	0-4	3.27	12.5
24	0-4	2.85	25
27	0-4	2.35	30
30	0-4	2.15	37.5
33	0-4	1.9	7.5
36	0-3	1.02	0
SEm±		0.24	
CD @ 5%		0.69	

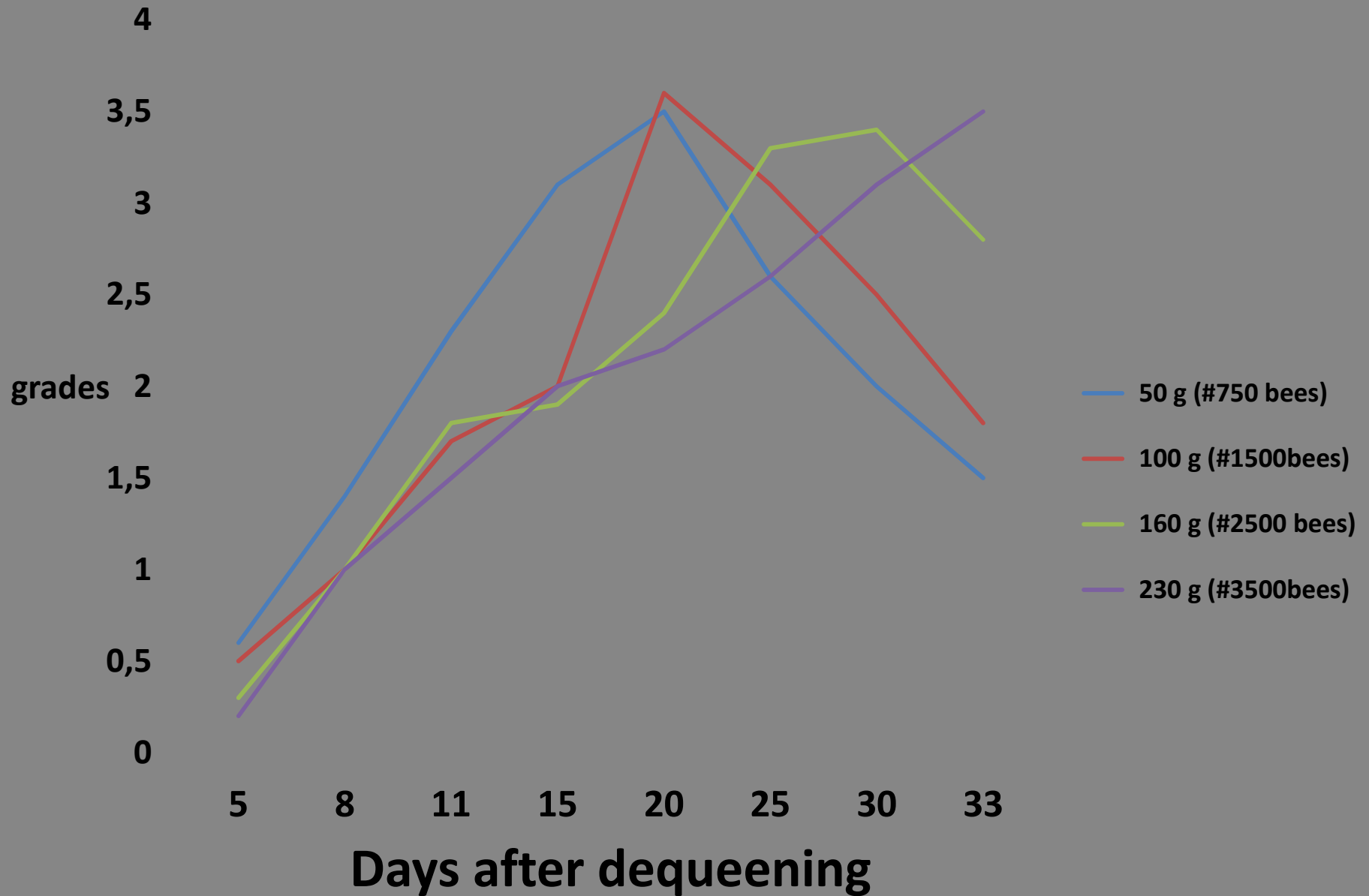
Influence of age of worker bees on ovary development

BATCH NO	AGE OF RELEASED BEES ON DAY OF DEQUEENING
I	10 days
II	7 days
III	4 days
1V	1 day

Influence of age of bees on worker ovary development

Days after dequeen- ing (DADQ)	Age of bees												
	4	7	10	13	16	19	22	25	28	31	34	37	40
3	0	0.2	0.6	1.0									
6	-	0.2	0.8	1.0	1.6								
9	-	-	0.6	1.4	1.4	2.0							
12	-	-	-	1.2	1.8	2.4	2.8*						
15	-	-	-	-	1.4	1.6	2.0	3.2*					
18	-	-	-	-	-	1.6	2.0	3.0*	3.5*				
21	-	-	-	-	-	-	1.2	1.4	2.8*	2.8*			
24	-	-	-	-	-	-	-	1.8	2.0	2.8*	2.4*		
27	-	-	-	-	-	-	-	-	2.7*	3.2*	0.8	0.6	
30	-	-	-	-	-	-	-	-	-	2.8*	3.2*	0.8	0.4

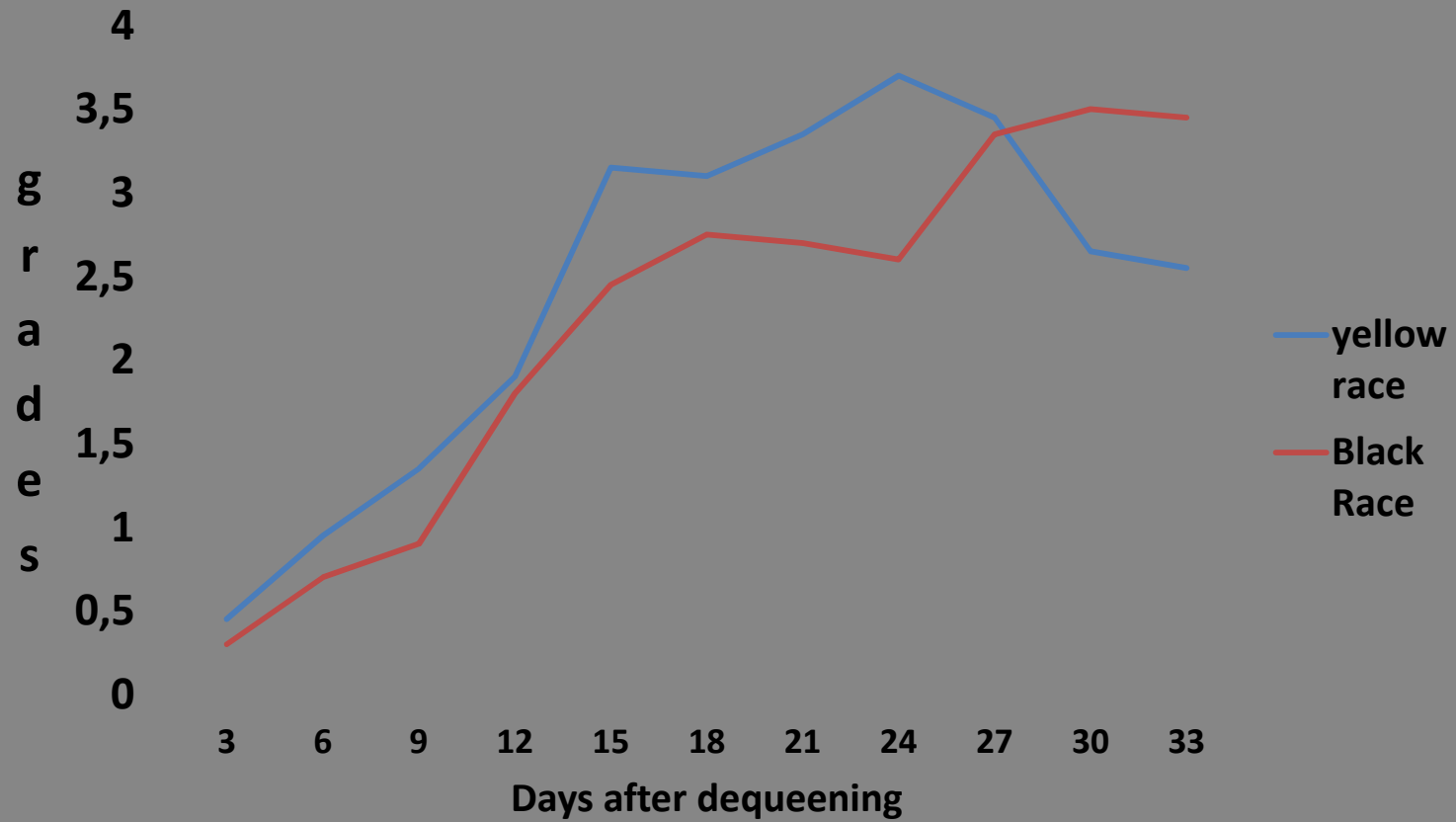
Influence of worker bee population on ovary development

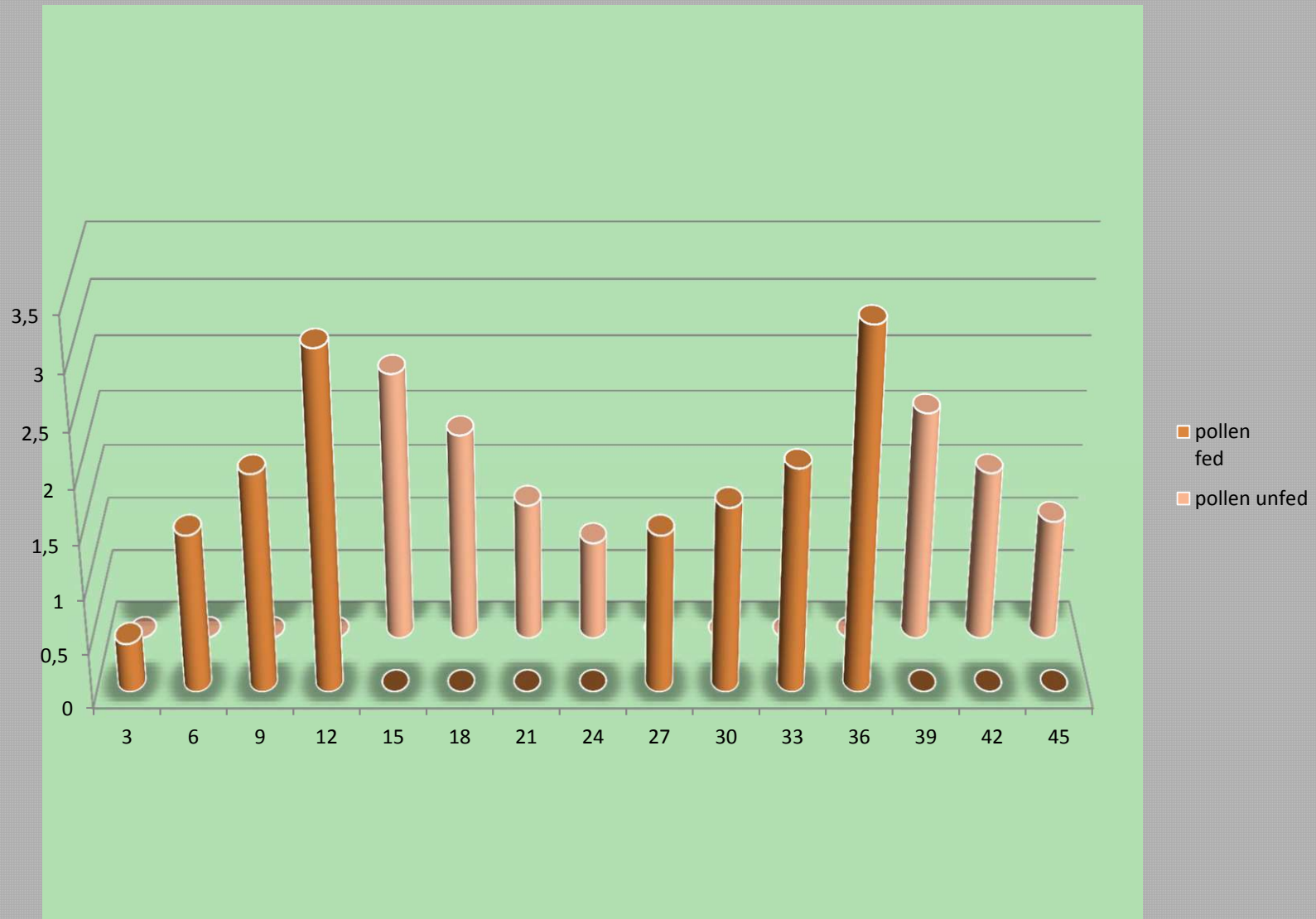


Apis cerena indica yellow and black races

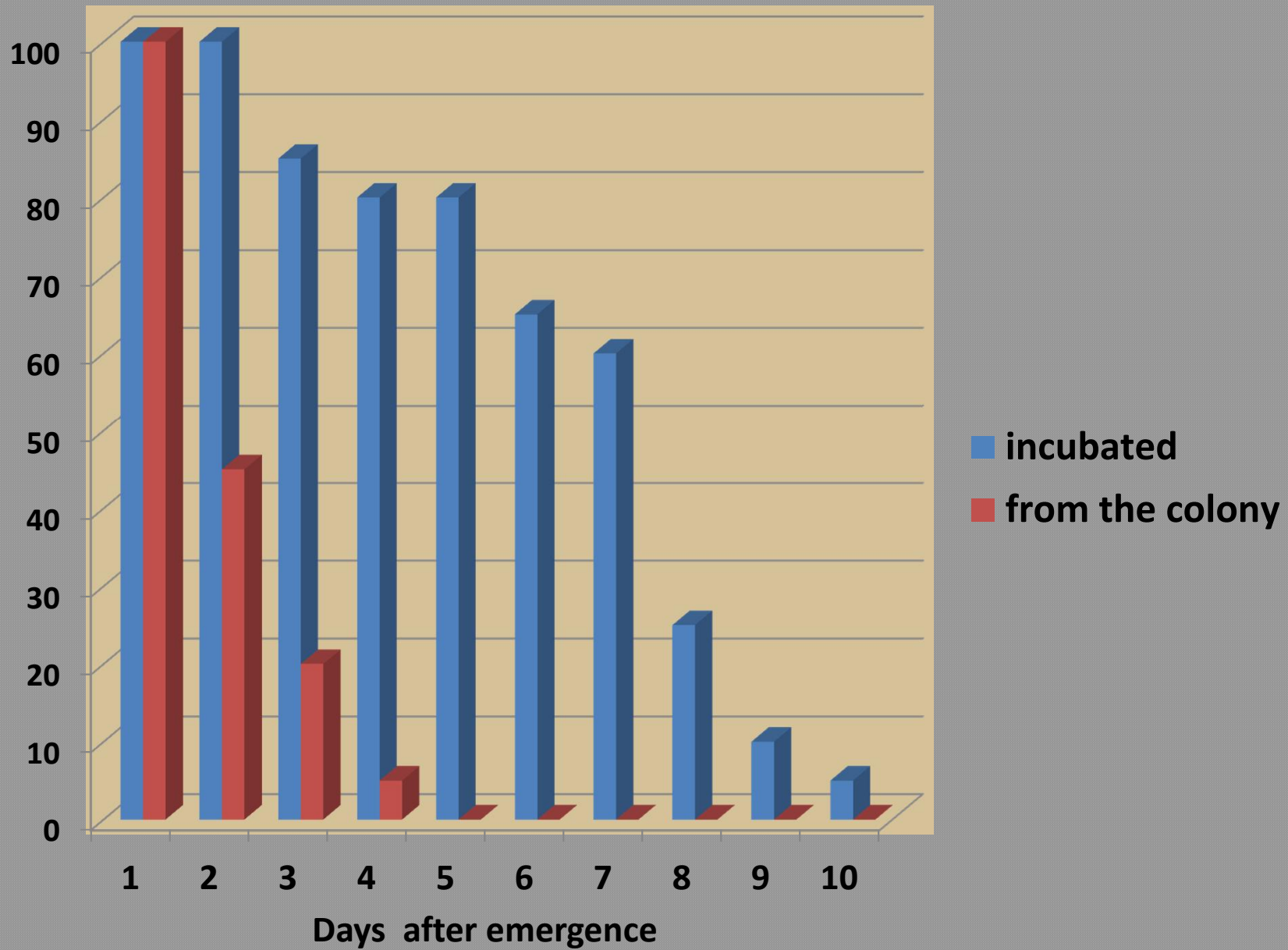


Worker ovary development in black and yellow races of *A. cerana indica* Fab.



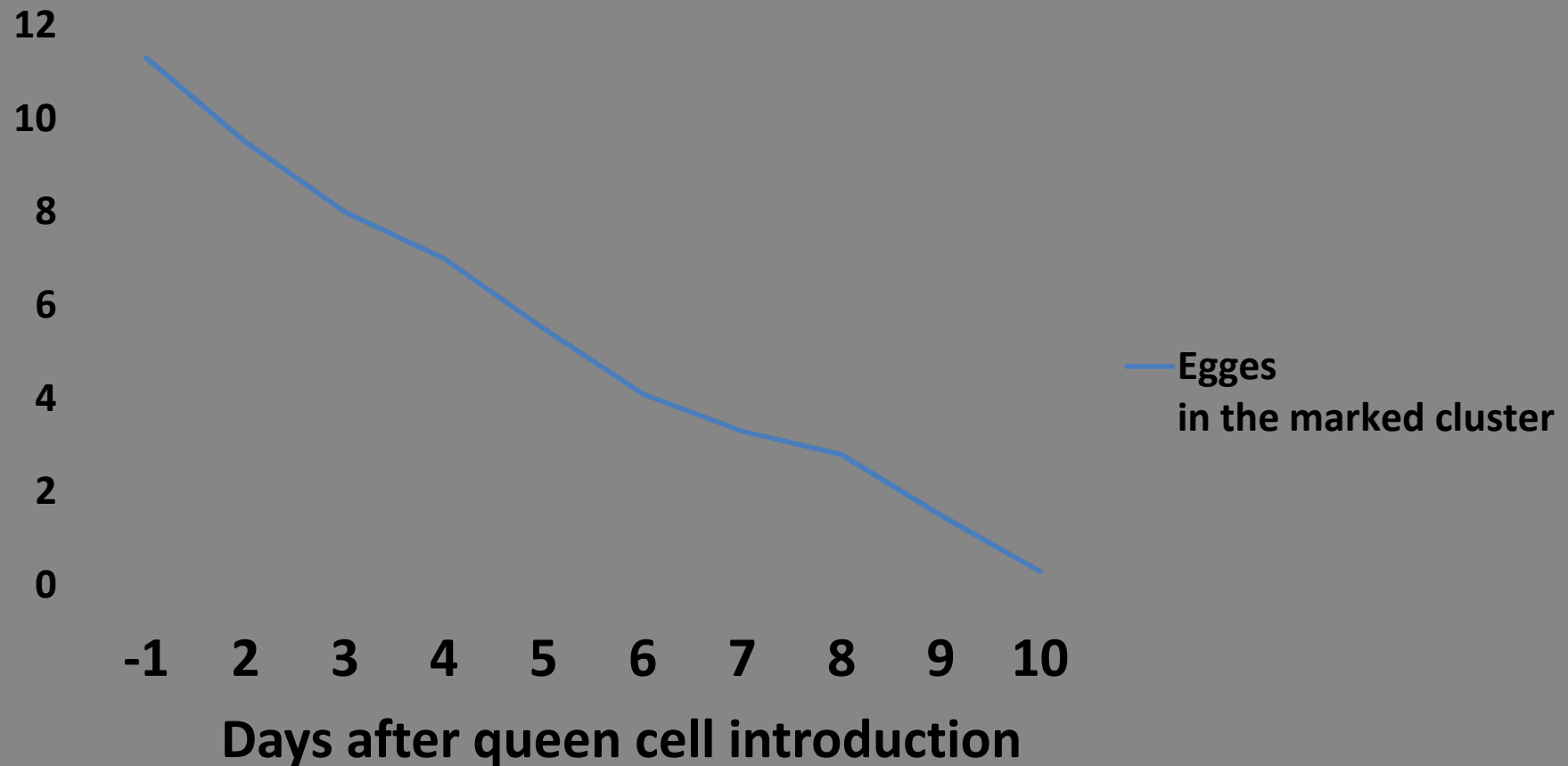


Percent acceptance of bees of different ages emerged from incubated brood and brood from queen right colony



Worker policing following queen cell introduction

Eggs in the marked cluster following queen cell introduction



Retrogression of worker ovaries following the introduction of brood

Days after brood introduction	Range	Ovary grades	
-1	1-4	2.9	
1	2-4	2.6	
2	0-2	1.0	
3	0-2	0.9	→ Queen cell made
5	0-2	0.6	
7	0-1	0.6	
9	0-1	0.2	→ Queen cell sealed
11	0-1	0.4	
13	0-1	0.3	
15	0-1	0.3	
17	0-1	0.2	
20	0-0	0.0	→ Queen emerged
24	0-0	0.0	

Worker ovary development in pollen and nectar foragers , house bees after dequeening

Days after de- queening	Ovary grades					
	Pollen foragers		Nectar foragers		House bees	
	Range	Mean	Range	Mean	Range	Mean
-1	0-0	0.0	0-0	0.0	0-0	0.0
3	0-0	0.0	0-1	0.1	0-1	0.6
6	0-0	0.0	0-1	0.2	0-2	1.2
9	0-1	0.2	0-1	0.4	0-3	1.6
12	0-1	0.2	0-2	0.7	1-4	2.5
15	0-1	0.4	0-2	1.0	2-4	3.2
18	0-1	0.5	0-2	1.2	2-4	3.2
21	-	-	0-2	1.2	1-4	3.3
24	-	-	0-1	0.9	0-4	2.1
27	-	-	0-2	0.9	0-3	1.4
30	-	-	0-2	0.8	0-3	1.1
33	-	-	0-2	0.5	0-2	1.0

**Ovary grades of worker bees at different time of return
after jarring**

Returning time of bees(min)	Mean ovary scores of returned bees	Range of ovary scores of returned bees
5	0.8	0-2
10	0.3	0-2
15	1.3	0-3
20	2.6	0-4
30	3.0	0-4
Bees in cluster after 30 min	3.4	2-4

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*Thank you
all*