Weight of honey bee queens and its effect on the quality of queens instrumentally inseminated

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Introduction

Quality of instrumentally inseminated honey bee queens depends on:

Genotype

Rearing priod and availability of natural protein food (pollen)

Rearing colony

strength of the colony, number of feeding worker bees in relation to number of reared young queens

Age of grafted larvae

young larvae (age 1-3 days) – higher weight of reared bee queens, higher number of ovarian tubules, higher volume of spermatheca

Keeping queens before and after insemination

conditions of keeping young queens, number of attendant workers

(Avetisyan 1961, Woyke 1971, Skowronek 2004, Kahya et al. 2008)

The aim of the research was to

verify the influence of weight of queens at emergence and at insemination day on oviducts condition and a number of spermatozoa in spermatheca

Plan of experiment, material and methods

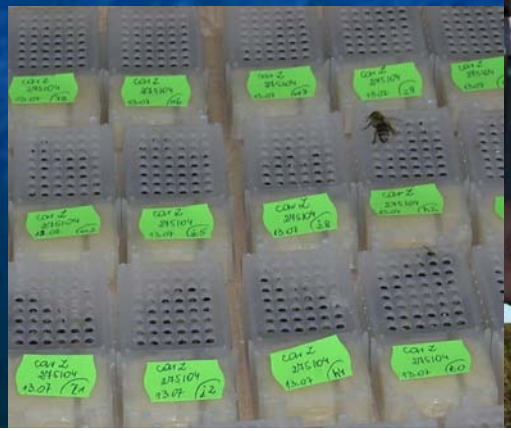
- The research was carried out in the years of 2007-2008 in the apiary belonging to Apiculture Division in Puławy
- Experimental material were Carniolan sister queens, Marynka line (*car* Mr) reared from 1-day-old larvae:

  - 5 days after larvae were grafted, capped queen cells were moved from nurse colonies into incubators

  (temperature: 34-35°C, air relative humidity: 70%)

Material and methods

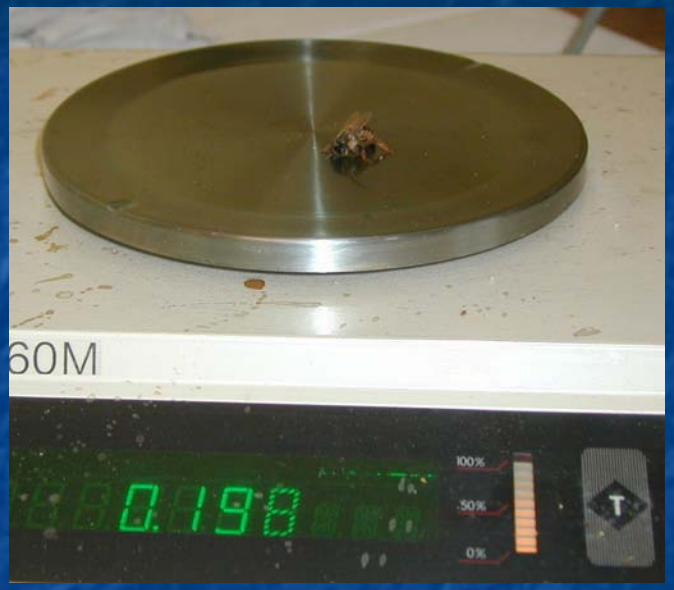
- Before insemination queens were kept in Zander cages in queenless colonies
- Queens were insemianted at the age of 7 days with a single dose of 8µl semen, then put into mailing cages with about 25 attendant workers and kept again in queenless colonies



Material and methods

Experimental queens were weight twice:

- at emergence day
- at insemination day



- The dead queen were counted 48 hours after insemiantion, surviving queens were killed and dissected to examine:
  - condition of oviducts
  - volume of spermatheca
  - number of spermatozoa in spermatheca

Reared bee queens by body weight at emergence day

Queens	n	%	Weight of queens at emergence day	Weight of queens at insemination day	Average loss of body weight	
			average (min-max)	average (min-max)	mg	%
light	88	24.6	174.0a (125-185)	153.5a (119-183)	20.5a	11.6a
medium	165	46.1	197.3b (186-210)	171.1b (115-212)	26.2b	13.2a
heavy	105	29.3	224.3c (211-250)	183.2c (131-218)	41.1c	18.3b
total	358	100	199.5	170.3	29.2	14.3

a,b,c – significant differences at $p \leq 0.05$

Influence of queens' body weight at emergence and insemiantion day on oviducts condition

Group of queens	No of queens		W E	W I	V	No of spermatozoa	
	n	%	mg	mg	mm^3	mln	SD
cleared oviducts	283	79.1	201a	172b	0.85a	4.007 b	1.4
semen residue	67	18.7	193a	166b	0.81a	2.873 a	1.1
dead after insemiantion	8	2.2	196a	153a	-	-	-
total	358	100	199,5	170.3	0.82	3.705	1.5

W E- weight of queens at emergence day; **W I**- weight of queens at insemination day ;
V- volume of spermatheca

a,b – significant differences at $p \leq 0,05$

Influence of body weight in queens with cleared oviducts on volume and number of spermatozoa in spermatheca

Queens	n	%	W E	W I	W L	V	No of spermatozoa	
			mg	mg	%	mm^3	mln	SD
light	57	20.1	174a	154a	11.3a	0.75a	3.56a	1.4
medium	137	48.4	197b	172b	13.0ac	0.85b	4.07b	1.4
heavy	89	31.5	224c	183c	18.2bc	0.92c	4.20b	1.4
total	283	100	201	172	14.3	0.85	4.01	1.4

W E- weight of queens at emergence day; **W I**- weight of queens at insemination day; **W L**- weight loss; **V**- volume of spermatheca

a,b,c – significant differences at $p \leq 0.05$

Conclusions

- The greatest body weight loss within first 7 days of life is observed among the heaviest queens
- The heavier queens after emergence the lower percemtage of individuals with some semen residue in oviducts
- The volume of spermatozoa and the number of spermatheca increase with an increase in queens' body weight