

ONSET OF OVIPOSITION IN HONEYBEE QUEENS KEPT IN BOXES WITH NON-FREE FLYING BEES

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S u m m a r y

The aim of the paper was to examine the start of egg lying by instrumentally inseminated queens kept both before and after insemination with non-free flying bees in closed boxes in a room without air-conditioning.

The experiment was carried out on queens reared from 1-day-old larvae in June and July. Sealed queen cells were introduced 1-2 days before queens emerging to boxes 130×115×70 mm settled with about 50 bees. Each box was provided with a comb, candy and a syringe with water. Queens were instrumentally inseminated twice at the age of the 7th and 9th day with 4 µl of semen. After the first insemination they were introduced to new boxes with about 250 bees and candy containing 5% pollen. Control group consisted of queens kept in trapezoid mating nuclei with about 400 bees. These queens were also instrumentally inseminated twice at the same age and with the same dose of semen.

It was found that queens kept in boxes started egg lying. However, insemination efficiency was worse than that in queens kept in nuclei. Queens in nuclei started egg lying on average 10 days after the first insemination, whereas those in boxes about 1.5 times later.

Keywords: honeybee queen, instrumental insemination, oviposition, box.

INTRODUCTION

The employment of instrumental insemination in the process of rearing honeybee queens has substantially contributed to the progress in beekeeping, i.e. to the introduction of highly productive and docile bee lines. By their appropriate crossbreeding, one obtains hybrids that produce significantly more honey than the starting material (Prabucki and Chuda-Mickiewicz 1998, 2000, 2002). A considerable portion of inseminated honeybee queens produced by breeding and reproductive apiaries consists of queens without verified oviposition (Troszkiewicz, personal communication). These queens are malevolently accepted by bees and their introduction into colonies requires the employment of suitable methods (Wilde et al. 2002). This

situation indisposes beekeepers for introducing them to apiaries. Woyke and Jasiński (1979 1980) recommend to keep queens with non-verified oviposition for two days more, after insemination, in boxes (with a capacity of 793 ml each) settled with 250-350 bees. Studies of Chuda-Mickiewicz and Prabucki (1993) showed that inseminated queens kept in the apiary in boxes accompanied by about 250 free flying bees started egg lying in the same time as those kept in trapezoid mating nuclei.

The aim of the study was to examine the onset of oviposition by queens kept both before and after insemination with bees in closed boxes placed in a room.

MATERIAL AND METHODS

Experiment was carried out in 2001 and 2002 on Carniolan (*Apis mellifera carnica*) queens bred in 2 rearing series. Queens were reared from 1-day-old larvae in a queenless colony, the first series was in June and the second in July. On 1-2 days prior to queens emerging, queen cells were introduced into boxes, 130x115x70 mm, settled with about 50 bees., A slice of comb was secured in the boxes to the ceiling, next to which a syringe with water was introduced through an opening in the ceiling, and a candy lying on a shelf above box

bottom. Boxes were kept in a room without air-conditioning both before and after queen insemination at 18-20°C. Queens were instrumentally inseminated twice at the age of 7 and 9 days, each time with 4 µl of semen. After the first insemination, they were introduced into new boxes settled with about 250 bees and provided with candy containing 5% pollen addition. Control group consisted of queens kept in trapezoid mating nuclei with about 400 bees. These queens were also instrumentally inseminated twice on the 7th and the 9th day of life with 4 µl of semen. The obtained data were analysed statistically with the use of Student's t-test.

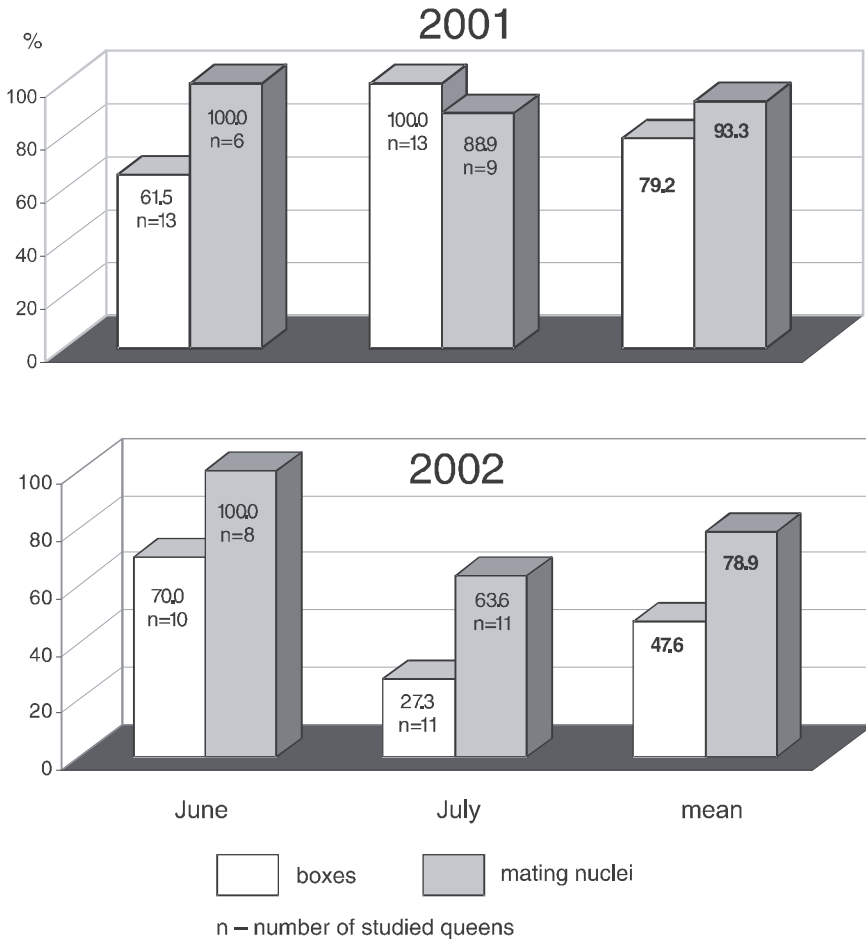


Fig. 1 Percentage of queens which started egg laying in boxes.. (in room) and mating nuclei

Table 1

Onset of oviposition in queens according to the method of their keeping before and after instrumental insemination

Year	Period of rearing	Method of keeping queens before and after insemination					
		Boxes			Mating nuclei		
		n	no. of days since 1 insemination to start of oviposition		n	no. of days since 1 insemination to start of oviposition	
			range	mean		range	mean
2001	June	8	13 - 21	14.2	6	8 - 10	8.5
	July	11	14 - 21	15.4	8	6 - 23	9.6
Mean				14.9 b*			9.1a
2002	June	7	16 - 28	19.4	8	8 - 20	12.4
	July	3	19 - 21	20.0	7	6 - 14	9.3
Mean				19.6b			10.9a
Overall mean				16.5b			10.1a

* numbers in rows followed by different letters differ significantly at $p=0.05$

RESULTS

Out of the total number of 79 instrumentally inseminated queens, 73.4% started egg laying. However, insemination efficiency (% of queens starting oviposition) differed in groups; from 64.4% in queens starting egg laying in boxes, to 85.3% laying eggs in nuclei (Fig. 1). Lower efficiency of insemination in queens kept in boxes was caused mainly by queens reared in July 2002. The same situation was found in queens kept in mating nuclei when the lowest number started egg laying. Thus, insemination efficiency depended upon the method of queen keeping and probably upon conditions during their rearing.

Time of starting the egg laying by queens depended upon the method of their keeping (Tab. 1). Queens kept in mating nuclei started egg laying significantly earlier than those kept in boxes. The former started oviposition on average 10.1 days after the first insemination. Queens kept in boxes started egg laying on average 6.4 days later. In the first study year, they started egg laying

14.9 days after insemination, and in the second one after 19.6 days. In 2002, queens kept in mating nuclei also started egg laying slightly later. Conditions prevailing during queen rearing influenced the results of queen insemination. This was noticed especially in the second study year, when insemination efficiency of queens kept in boxes was low and onset of oviposition was delayed.

CONCLUSIONS

The obtained results show, that the percentage of instrumentally inseminated queens which started oviposition in boxes is lower (ca. 20%) than that achieved in mating nuclei and the time of beginning of oviposition is over 1.5 times longer.

REFERENCES

- Chuda-Mickiewicz B., Prabucki J. (1983) - Podejmowanie czerwienia przez inseminowane matki pszczoły przetrzymywane w skrzynkach w asyście swobodnie oblatujących się pszczół. *Pszczeln. Zesz. Nauk.* 37: 23-31.

- Prabucki J., Chuda-Mickiewicz B. (1998) - Results of the middle European bee improvement in Western Pomerania. Fol. Univ. Agric. Stetin. 185 *Zootechnica* (36):27-37.
- Prabucki J., Chuda-Mickiewicz B. (2000) - Doskonalenie towarowe użytkowanych w Polsce ras pszczół. Fol. Univ. Agric. Stetin. 210 *Zootechnica* (39):131-142.
- Prabucki J., Chuda-Mickiewicz B. (2002) - Honey yield of Polish commercial lines of middle European bee (*Apis mellifera mellifera* L.) and their crossbreed with other races. 5th International Conference the Black Bee *Apis mellifera mellifera*, September 2-6, 2002, Wierzba, Poland, Programme and summaries:22.
- Wilde J., Wilde M., Gogolewska E. (2002) - Łatwe i skuteczne sposoby wymiany matek pszczelich. *Pszczelnictwo* 53(4): 4-6.
- Woyke J., Jasiński Z. (1979) - Number of worker bees necessary to attended instrumentally inseminated queen kept in an incubator. *Apidologie* 10(2):149-155.
- Woyke J., Jasiński Z. (1980) - Influence of number of attendant workers on the results of instrumental insemination of honeybees queens kept in room temperature. *Apidologie* 11(2):173-180.

ROZPOCZYNANIE CZERWIENIA PRZEZ MATKI PSZCZELE PRZETRZYMYWANE W SKRZYNKACH Z PSZCZOŁAMI BEZ MOŻLIWOŚCI OBLATYWANIA SIĘ PSZCZOŁ

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S t r e s z c z e n i e

Doświadczenie przeprowadzono w 2001 i 2002 roku na matkach wychowywanych z 1-dniowych larw w czerwcu i lipcu. Mateczniki na 1-2 dni przed wygryzieniem się matek poddawano do zasiedlonych ok. 50 pszczołami skrzynek o wymiarach 130x115x70 mm. W skrzynkach umieszczony był plasterek woszczyny, ciasto miodowo-cukrowe i strzykawką z wodą. Skrzynki do czasu inseminacji jak i po unasiennieniu matek przetrzymywano w nieklimatyzowanym pomieszczeniu. Matki inseminowano dwukrotnie w wieku 7 i 9 dni, 4μl nasienia. Po pierwszej inseminacji poddawano je do nowych skrzynek z ok. 250 pszczołami i ciastem miodowo-cukrowym z 5% dodatkiem pyłku kwiatowego. Grupę kontrolną stanowiły matki przetrzymywane w ulikach weselnych z ok. 400 pszczołami. Matki te również inseminowano dwukrotnie w 7 i 9 dniu ich życia, 4μl nasienia.

Stwierdzono, że matki przetrzymywane w skrzynkach podejmują czerwienie. Skuteczność unasieniania była jednak gorsza niż u matek przetrzymywanych w ulikach weselnych. Okres rozpoczęcia czerwienia był zróżnicowany. W ulikach matki przystępowały do składania jaj średnio po 10 dniach od pierwszego unasieniania, natomiast w skrzynkach ok. 1,5 raza później.

Słowa kluczowe: matka pszczela, unasienianie, rozpoczynanie czerwienia, skrzynka.