ORIGINAL ARTICLE

STUDY ON A HIGH PERFORMANCE INTEGRATED BEEKEEPING TECHNOLOGY
STUDIU ASUPRA UNEI TEHNOLOGII APICOLE INTEGRATE DE INALTA PERFORMANTA

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REZUMAT

Acest studiu a avut ca scop evaluarea economica a unei tehnologii moderne de inalta performanta pentru cresterea albinelor in familii cu putere sporita. Noua tehnologie elimina dezavantajele tehnologiei traditionale care utilizeaza doar culesurile naturale de la salcim , tei, floarea soarelui, flora spontana, de cele mai multe ori afectate de conditiile climatice nefavorabile (seceta, ploi), ceea ce face ca in sezonul de iarna si in perioada critica pina la primul cules sa se piarda o insemnata cantitate de albina. Tehnologia moderna asigura un spor de albine de 75 %, cresterea capacitatii de ouat a matcii cu 33 %, reducerea cu 50 % a pierderilor de albina in sezonul de iarna, cresterea productiei cu 20 % la miere, cu 50 % la propolis, cu 33 % la polen, cu 50 % la roiuri, cu 60 % la laptisor de matca si cu 50 % la venin de albina. Ea se bazeaza pe un management stiintific al hranirii albinelor prin aplicarea de hraniri de stimulare, de completare si proteice (turte de polen si/sau substituenti de polen ca laptele praf degresat si turte de soia), care presupune costuri specifice ce variaza intre 9,73 – 10,06 USD/ familie/an. Cheltuielile totale de crestere a albinelor au fost estimate la 17,83 USD/familie/an, din care 55,5 % cheltuieli cu hranirea , 3.2 % cu tratamentele, , 6,8 % cu inlocuirea matcii, 13,5 % cu procurarea de rame si faguri noi, 17,4 % cu transportul in transhumanta si restul de 3,6 % cu forta de munca. De la o stupina standard (100 familii de albine cu capacitate sporita) se poate obtine un venit anual de 12.100,4 USD cu 55,9 % mai mult decit in cazul stuparitului traditional. In concluzie, noua tehnologie asigura o eficienta biologica si economica ridicata, un spor de profit de cca 3.350 USD, adica un profit cu 48 % mai mare decit in cazul tehnologiei clasice. Pe acest motiv, recomandam ca aceasta tehnologie sa fie implementata de apicultorii care doresc sa isi transforme stupinele in ferme comerciale de inalta performanta.

Cuvinte cheie: tehnologie apicola integrata, eficienta economica inalta, familii de albine cu putere crescuta, hranire stimulativa, complementara si proteica

ABSTRACT

This study aimed to make an economic evaluation of a high performance modern beekeeping technology leading to an increased bee family capacity. The new technology removes the disadvantages of the traditional one utilising just natural picking based on Robinia, Lime, sunflower and wild flora, most of times deeply affected by unfavourable climate conditions (drought, rainfalls) and conducting to important bee losses during the winter season and mainly during the critical period till the next picking. The modern technology assures 75 % more bees per family, an increased queen laying capacity by 33 %,, a 50 % reduction of bee loss in winter season, by 20 % more honey , by 50 % more propolis, by 33 % more pollen, by 50 % more swarms, by 60 % more royal jelly and by 50 % more bee venom. The modern technology is based on a scientific feeding management applying a stimulating, completing and proteinic feeding (pollen cake and/or pollen substitutes such as: degreased powder milk 30 % and soya bean cake), involving peculiar costs ranking between USD 9.73-10.06 per family/year. The total bee rearing costs have been estimated at USD 17.83 in average per family/year, of which: 55.5 % feeding costs, 6.8 % queen replacement cost, 3.2 % treatments cost, 13.5 % costs for supplying new frames and combs,

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17.4 % transportation costs for moving of bee families and the remaining of 3.6 % labour costs. Taking into account a standard apiary (100 bee families of an increased power), a beekeeper can obtain an USD 12,100.4 annual income, by 55.9 % higher than in case of the traditional beekeeping technology. As a conclusion, the new technology assures a higher biological and economical efficiency, USD 3,350 profit gain that is a profit by 48 % higher than in case of the classic technology. For this reason, we recommend this modern technology to be implemented by beekeepers if they would like to transform their apiaries into high performance commercial farms.

Keywords: integrated beekeeping technology, high economic efficiency, increased capacity bee families, stimulating, completing and protein feeding

DETAILED ABSTRACT

Beekeeping could become a high efficient agricultural branch if we should improve feeding as well as bee rearing management. Feeding is one of the most determinants of the number of bees/family, bee family capacity during the critical periods of the year (such as winter season till the next picking as well as when picking is not enough), honey and other bee productions, beekeeper's incomes and profit. Therefore modern technologies are required to improve bee feeding and strengthen bee family capacity. The new technology applied on the occasion of this study aims to assure a better feeding for a longer period of time, besides the natural feeding resources. It is based on an additional feeding consisting of a stimulating, a completing and a proteinic feeding provided by the beekeeper as follows: ***stimulating feeding*** consisting of 500 ml sugar syrup (1:1) every two days/family between March 15 and April 15 and then again between August 15 and September 30; ***completing feeding*** consisting of 5-6 litre sugar syrup (1:1) for 7-10 days allotted during the period lacked of natural resources (drought and rainy seasons etc); ***proteinic feeding*** based on *pollen cakes and sugar or pollen substitutes* (degreased powder milk or soybean cake). In order to study the effects of this new feeding technology on bee family capacity as well as on the economic results, two experimental apiaries have been used: V1- a normal apiary consisting of 100 bee families with a normal capacity, just naturally fed and V2 – a modern apiary formed of 100 higher capacity bee families, additionally fed along the year. Comparing the performances recorded by the two alternatives, we draw the conclusion that V2 is the best choice to increase both the biological and the economic efficiency in the apiary for the following reasons: the modern technology assures 75 % more bees per family, an increased queen laying capacity by 33 %, a 50 % reduction of bee loss in winter season, by 20 % more honey, by 50 % more propolis, by 33 % more pollen, by 50 % more swarms, by 60 % more royal jelly and by 50 % more bee venom and all these under an yearly feeding cost ranking between USD 9.73 – 10.06/ family. The total bee rearing costs have been estimated at USD 17.83 in average per year, of which: 55.5 % feeding costs, 6.8 % queen replacement cost, 3.2 % treatments costs, 13.5 % costs for supplying new frames and combs, 17.4 % transportation costs and 3.6 % labour cost. From an increased capacity standard apiary, a beekeeper could obtain an USD 12,100.4 annual income, by 55.9 % higher than in case of the traditional beekeeping technology. The average annual profit got by a beekeeper could be around USD 10,300, by 48 % higher than in case of the classic technology. Therefore, there are some strong arguments to recommend this modern technology to any beekeeper that is interested to transform his/her apiary into a high performance commercial farm.

INTRODUCTION

The number first determines the production performance of a bee family and vitality of its bees, close related to the amount of young bees assured by queen's laying capacity. Secondly, it is also due to the specific technological management concerning nest protection against low temperatures during the winter season and additional feeding in the periods when honey reserves are not sufficient till the next picking and the family is in danger to loose an important amount of bee babies. For avoiding bees and production losses, a modern technology has been established aiming to assure a better feeding for a longer period of time, besides the natural feeding resources. It is based on an additional feeding consisting of a stimulating, a completing and a proteinic feeding, provided by the keeper in order to cover the family needs till the first picking in the coming year(1,2,3). This study aims to estimate the economic performance of the new beekeeping technology in comparison with the traditional one.

MATERIAL AND METHOD

In our investigation we used two experimental apiaries: V1- a normal apiary consisting of 100 bee families with a normal capacity, just naturally fed and V2 - a modern apiary consisting of 100 higher capacity bee families, additionally fed along the year. Three sorts of feeding have been assured to the V2 apiary as follows:

F1- ***stimulating feeding*** based on 500 ml sugar syrup (50 % water and 50 % sugar), every two days/family, applied between March 15 and April 15 and again between August 1 st and September 30, in order to strengthen the capacity of the bee family;

F2 -***completing feeding*** based on 5-6 litre sugar syrup (1:1 concentration) for 7-10 days, allotted during the period lacked of natural feeding resources such as: drought and rainy seasons;

F3- ***proteinic feeding*** based on: a) ***pollen cakes and sugar,*** 8 portions of 100 g/family supplied starting from February 15 by the end of March; a pollen cake weights 10 g and consists of 70 g sugar and 30 g pollen; b) ***pollen substitutes*** such as : ***degreased powder milk :*** 8 portions, each one consisting of 300 g powder milk mixed with 700 g sugar and 200 g honey per family supplied during the critical periods mentioned above and ***soy bean cake*** : 8 portions totalizing 800 g/family/year, consisting of 7.5 kg soy bean cake and 700 g sugar , could be successfully used during the winter period till the first picking.

For the both experiments, the following technological parameters have been recorded: the amount of bees, queen's prolificity, bees and production losses in winter time (honey, pollen, propolis, swarms, royal jelly, venom, wax). Also we evaluated the costs related to stimulating, completing and proteinic feeding, but also all the technological costs including treatments, queen replacement, new frames and combs, transportation and labour as well. For each type of apiary we estimated incomes resulting from selling all the bee products. Finally we determined profit and profit rate. All the results are compared between the two experiments in order to show that V2 is the best alternative a beekeeper can chose if he/she would like to increase biologic and economic efficiency in his apiary.

RESULTS AND DISCUSSION

The integrated beekeeping technology assures 3.5 kg bees/family, 1,600 eggs/day queen laying capacity, 50 % reduction of bee losses in winter season, 24 kg honey, 450 g propolis, 8 kg pollen, o.45 bee swarms, 800 royal jelly, 9 g bee venom, 1 kg wax from 10 combs and 1,200 g from the grown combs. In comparison with the classic beekeeping, the modern one looks to be the best (table 1).

Additional feeding costs are ranking between USD 9.73 for F1 and USD 10.06 for F3 as one can see from table 2.

Technological costs are definitely varying from V1 to V2 as long as they include feeding costs representing in average around 55 % of total costs. So, the total costs for the classic technology is USD 7.92 while the total costs for applying the new technology are USD 17.83/family/year (table 3)

Table 1. Main Parameters of the Integrated Beekeeping Technology / Principalii parametri ai tehnologiei apicole integrate

Parameter (Parametrul)	M.U.	V1-Normal capacity bee family Familie de albine cu putere normala	V2- Increased capacity bee family / Familie de albine cu putere sporita
Amount of bees / Cantitatea de albina	kg	2	3.5
Queen Laying Capacity / Capacitatea de ouat a matcii	eggs/day	1,200	1,600
Bee loss in winter time / Pierderile de albina pe timpul iernii	kg	100	50
Honey Production, of which / Productia de miere,d.c. -Robinia honey(salcim) -Lime honey (tei) -Mixed honey (poliflora)	kg	20 8 2 10	24 14 3.5 16.5
Propolis	g	300	450
Pollen (polen)	kg	6	8
Bee swarms (Roiuri)	no.	0.3	0.45
Royal jelly / Laptisor de matca	g	500	800
Venom (venin)	g	6	9
Wax from 10 combs / Ceara de la 10 faguri	kg	1	1
Wax from built combs / Ceara de la faguri crescuti	g	600	1,200

Table 2. Additional Feeding Costs assuring an increased capacity bee family / Cheltuieli suplimentare cu hranirea care asigura familii de albine cu putere sporita

Feeding Cost Items / Elemente de cheltuieli cu hranirea	Costs per bee family – USD / Cheltuieli pe familie de albine- USD
Stimulating feeding (Hranire de stimulare)	3.87
Completing feeding (Hranire de completare)	5.17
Proteinic feeding (Hranire proteica) -Pollen cake (Turte de polen) -Pollen substitutes (Substituenti de polen) -Degreased powder milk (Lapte praf degresat) -Soy bean cake (Turte de soia)	 0.69 0.90 1.02
Total feeding costs (Cheltuieli totale cu hranirea) -F1 Stimulating+Completing+Proteinic Feeding with Pollen cake (Hranire de stimulare, de completare si proteica cu turte de polen) -F2 Stimulating+Completing+Proteic feeding with degreased powder milk (Hranire de stimulare, de completare si proteica cu turte de polen) -F3 Stimulating+Completing+Proteinic feeding with soya bean cake (Hranire de stimulare, de completare si proteica cu turte de soia)	 9.73 9.94 10.06

Table 3. Technological costs per bee family/year / Cheltuielile tehnologice pe familie de albine/an

Cost item / Elementul de cheltuieli	V1	V2		
		F1	F2	F3
Total costs , of which : / Cheltuieli totale, din care;	7.92	17.65	17.86	17.98
-Additional feeding costs (Cheltuieli cu hranirea supliementara)	-	9.73	9.94	10.06
-Treatments costs (Cheltuieli cu tratamentele)	0.57	0.57	0.57	0.57
-Queen replacement costs (Cheltuieli cu inlocuirea matcii)	1.21	1.21	1.21	1.21
-New frames and combs (Cheltuieli cu ramele si fagurii noi)	2.41	2.41	2.41	2.41
-Transportation costs (Cheltuieli de transport)	3.11	3.11	3.11	3.11
-Labour cost (Cheltuieli cu forta de munca)	0.62	0.62	0.62	0.62

Incomes/standard apiary is obviously the highest ones in case of V2: USD 12,100.4/year, directly determined by the higher number of bees and bee productions. V2 assures an income by 55.9 % higher than V1 (table 4).

The both technologies are profitable, but using V2 an apiarist could get USD 10,317.4 profit/year by 48 % more than a beekeeper using the classic technology (table 5) .

Table 4. Yearly Income per Standard Apiary (100 bee families) / Venitul anual per stupina standard (100 familii de albine) USD/bee family

Income Source (Sursa de venit)	V1- Normal Bee Family	V2 - Increased capacity bee family
Additional bee / Albine suplimentare	-	130.3
Honey (Miere): -Robinia (salcim) -Lime (tei) -Mixed (poliflora)	1,273 617.9 137.9 517.3	2,176 1,081.3 241.3 853.4
Propolis	387.9	581.8
Pollen (Polen)	1,034.4	1,379.3
Bee swarms (Roiuri de albine)	465.5	698.2
Royal Jelly (Laptisor de matca)	3,448.2	5,517.2
Bee venom (Venin de albine)	931.0	1,396.6
Wax from (Ceara de la): -Culled combs (faguri reformati) -Grown combs (faguri crescuti)	 137.9 82.8	 137.9 82.8
Total incomes (Venituri totale)	7,760.8	12,100.4

Table 5. Annual Financial Results in Modern Beekeeping/ Standard Apiary (100 bee families) / Rezultate financiare anuale in apicultura moderna /stupina standard (100 familii de albine) USD/standard apiary

Indicator	V1	V2		
Total Incomes (Venituri totale)	7,760.8	12,100.4		
Total Costs (Cheltuieli totale)	792.0	1,765	1,786	1,798
Profit	6,968.8	10,335.4	10,314.4	10,302.4
Profit Rate (Rata profitului)	879.89	585.57	577.5	573.0

CONSLUSION

-The modern integrated beekeeping technology assures a mix of feeding strengthening bee family capacity.
-More bees and higher productions could be obtained by applying additional feeding during the critical periods of the year when picking is missing or not enough.
-A beekeeper rearing bee families additionally fed could get a profit by 48 % higher than in case of practising the traditional beekeeping based only on natural feeding resources.

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