

1. Project name and contact information.

Beekeeping: More honey with less chemicals FNE 04-504. I may be contacted by mail at: Craig Cella, 867 E. Winter Rd. Loganton, Pa. 17747 or Telephone 570-725-3682.

2. Goals:

I wanted to see if there was a relationship in disease and swarming between hives with new foundation or old comb.

3. Farm Profile:

We have a small herd of registered Polled Hereford cattle and hay production on 120 acres along with 100 or more honey bee colonies. We also hatch game birds for other growers.

4. Participants:

My technical advisor was Dennis Van Engendorp that works as the Pa. State Apiarist in Harrisburg, Pa. He came to our farm with four other lab people to help collect samples and data from the hives. Times when he couldn't make it he would send other people as needed. I have also spent a great deal of time reviewing my findings with my collaborators during the past two years.

5. Project Activities:

My project really started in mid February when the semi delivered my equipment of 500 supers, 5000 frames and 5000 sheets of foundation. I felt with my other equipment that I had purchased two years earlier I would have enough for 100 new packages plus the 17 overwintered colonies that I had. I started to assemble the equipment immediately and painting followed next. I also had other work that had to be done during this time so I was really pressed for time. I finished up the night before we left for Ga. to pick up our packages. My brother and I started to hive the bees in the afternoon on the day we returned with 50 placed on foundation and 50 on older drawn comb. Later five people collected virus sample bees - counted mites and recorded the findings. All hives were numbered and later moved to different locations spread out over 70 miles and from river bottom to mountain top. All of these hives (except one location) were measured again for virus levels, mites, and this time production. By now I knew the results and what they meant. With the coming of spring I also knew my losses would be heavy so I ordered another 90 packages and decided to not repeat the same program. I instead decided to try a different swarm control approach and measure production. Also in August I made up 30 new package hives with bees from some of those colonies to see if there was a difference in queens from different suppliers.

6. Results:

They were not what I expected. Dennis put all the numbers into the computer and it came down to the fact that the swarming rate, mite levels and production were basically the same whether or not it was new equipment or old. Sixty four hives swarmed at least once, 27 at least twice, and 21 didn't swarm at all. The top 10% had an average weight of 210 lb. and the bottom was at 110 lbs. total weight. Deduct 75 lbs. in all these weights as equipment for a total production of 210 minus 75 lbs equals 135 lbs and for the bottom 10% an average production of 35 lbs. Another way to look at these averages is the top third had a 109 lb.

net gain and the bottom third finished the season with only 41 lbs. average. This means that 1/3 of the hives would die of starvation the first winter if something else didn't kill them first. Since all hives were managed the same there is only one variable - the queen.

In the second year I decided not to repeat my first years work but to apply my resources in a slightly different direction. Thirty four days after the packages were installed four bee Inspectors worked as two man teams and measured and recorded the brood in each hive. Later during the last week in May every other hive had it's queen removed as a swarm control measure and production was measured in late July. Later in early August I removed 95 lbs. of bees from hives in one yard and used them to establish 30 new package colonies with new queens to see if there is a difference in production between suppliers. Finally in early September all colonies were treated with formic acid for mite control. Formic Acid was just approved for use in Pa. this past spring and is not a "hard" chemical. It is a natural ingredient found in honey, also produced by ants and leaves no residue in the wax nor do the mites develop a resistance to it.

#### 7. Condition:

It was a typical farming operation with the same small problems. I had some drifting problems in the beginning so now I really wet the bees down and plug the entrance shut when I install packages. I also try to set the hives further apart and the rows are perpendicular to the prevailing winds. Another simple thing I learned was to crumble up 5 pages of newspaper and put them in the deep super surrounding the bob white water I use as a feeder. This will keep the bees from wanting to hang on the inside of the cover so they will stay down on the frames with the queen. I did lose one yard to a flood in September 2004 but with four other locations I feel my results are representative of the study.

#### 8. Economics:

I learned you must control mites and virus levels. This can be done without the use of "hard" chemicals both by IPM and the use of natural controls such as Formic Acid and Api - Life VAR.

You must learn to identify the bottom half of your hives for production and requeen those. But remember of the new queens that are introduced maybe a third will be of poor quality so keep culling the bottom ones out each year. The hives that I removed the queen from produced less honey and some still swarmed - just later so that idea was a flop. The brood that was measured in late May showed me the same spread of a queen's production as the hives did the first year. From a low of 245 sq. Inches to a high of 1000 sq. inches. This same pattern was apparent again in September with the 30 packages I made up in August.

#### 9. Assessment:

Two thoughts have come about because of this project - the first is that you must control



the mites in some way. The second is that a bee farmer must adapt culling principals used in other farm operations. As an example, one half of the dairy herd heifer calves will be culled by the end of their first lactation. I am also going to keep pushing for side by side comparisons of bees from different sources just as PSU does with their corn test plots. There is no real incentive for a breeder to upgrade at this point - just produce as many queens as possible and sell them. We need testing on a large scale to show mite resistance temperament - honey and pollination production.

10. Adoption:

I am going to control mite population with IPM and organic treatment instead of hard chemicals. I also want to try a new management technique that I feel may work. That is to divide all colonies in early spring and introduce a new queen into the queenless half. At the end of production I will remove the bottom producing  $\frac{1}{2}$  of the queens and unite them with a good hive. This way I have double the production and only a small capital Investment.

11. Outreach:

To date I have spoken at two state level meetings and one regional level training seminar of which I am scheduled again in February. I have given presentations on my findings at over a dozen smaller meetings ranging from talks at Lock Haven University, Farm City Days, vegetable growers meetings, pumpkin growers meetings, Pa. Ag Progress Days, and several beekeeping organization meetings. Some of these talks are given with a live hive and I supply veils so people can get in and see first hand what goes on. This research will also be sent in to the American Bee Journal's editor, Joe Graham later this fall.

12. Summary:

My initial purpose was to produce more honey with less chemicals. I installed 100 packages of bees the first year and another 90 the second and also set up 30 more in August 2005. I have proven the mites can wipe you out the first winter sometimes and you don't have to use the "hard chemicals". Also that all queens are not equal and you must cull the bottom half to increase your net income. The industry also needs actual field testing of different suppliers bees if we are going to improve as other farm productions have.

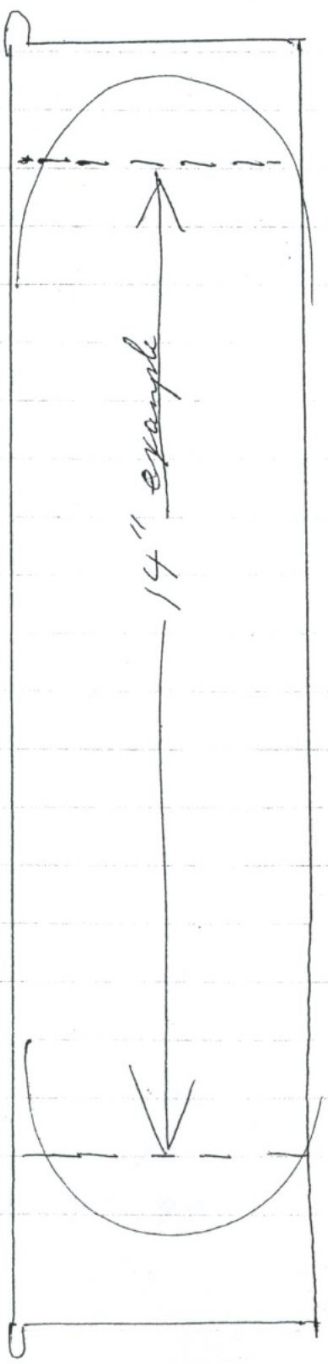
Craig Cella

November 21, 2005

- 255"
- 246"
- 244"
- 218"
- 214"
- 204"
- 200"
- 199"
- 192"
- 190"
- 188"
- 186"
- 183"
- 182"
- 180"
- 180"
- 175"
- 170"
- 160"
- 158"
- 156"
- 150"
- 145"
- 142"
- 127"
- 114"

Area of brood in each  
hive.

4/27 installed - 3<sup>rd</sup> ply  
5/30 measured - 34 days old



• = Buckfast

51+

1

My Hives

200"	123	97	75
190"	118	97	74
184	117	96	73
160	117	95	72
157	116	95	69
156	116	95	68
153	112	95	55
150 unmarked queen	111	95	52
148	111	95	52
145	111	94	49
141	111	94	$\frac{5}{245 \text{ sq } "}$
141	110	94	
138	110	93	
138	110	93	inches
137	110	90	of brood
137	108	90	in ply installed
135	108	90	4/5/05
134	108	90	measured on
133	108	90	5/10/05 (35 days)
132	108	88	
132	107	86	
132	103	85	
130	103	84	
130	103	82	
130	103	80	
129	102	79	
129	102	79	
128	99	78	



	105	hive #	9/8/05	9/19	3 M PKg	10-1-05	
-1		68	170"	230" pms	Excl.	Good - lots of bees	o.k. .1897
S-2		64	95"	56"	Fair	Fair - Lite	.1897
S-3		62	22"	26" Killed			.2018
S-4		61	32"	68" pms	poor	Poor - 0 frames, bees - V. Lite	.1753
S-5		63	drifted in - not for			record - Excl	.1724
S-6		67	120"	140"	o.k.	Good - Lots of bees	o.k. .2117
S-7			D.O.	Read Out			.2319
S-8			D.O.				
S-9		66		150" pms-mild-good		Good - lots of bees	o.k. .202
S-10		65	85"	125"	excel	Fair - Fair brood - Lite	.1728
R-1			D.O.				.2182
R-2		84	120"	190"	excel	Good - Lots of bees	o.k. .2159
R-3		81	100"	98" good - Lite		v. Good - Lite	.2089
R-4		85	95"	136" pms - good		Good - Lots of bees	o.k. .214
R-5		82	68"	135" pms		Good - Lots of bees	o.k. .230
R-6		87	127"	280" excel		Good - Lots of bees	o.k. .2381
D-1		121	170"	210" excel		Good - Lots of bees	o.k. .2086
D-2		112	95"	185" pms excel		Fair	o.k. .2002
D-3		108	90"	140" excel		Good - Lots of bees	o.k. .2039
D-4		105	45"	106" pms Fair		NO Queen	.2218
D-5		111	32"	90" pms Fair			.2046
D-6		118	120"	175" pms Excl.		Good - lots of bees	o.k. .206
D-7		103	96"	134" Lite		Fair - good brood Lite	.2035
D-8		114	70"	110" pms Fair		Good - lots of bees	o.k. .2072
D-9			D.O.				.2075
D-10			D.O.				.1867
D-11		100	90"	111"		Fair	.2025
D-12		115	150"	180"		Good - lots of bees	o.k. .197
D-13		107	122"	150" excel		Good - lots of bees	o.k. .1957
D-14		113	70"	145"		Good - Lots of bees	o.k. .2171

## Condensed Data

There were 5 locations over a 70 mile spread - river bottom to mountain top

Data collected twice - July 5 and Sept. 16

One yard lost in flood Ivan on Sept. 17 - 18 hives.

Started with 100 packages - 50 installed on new foundation, 50 installed on drawn, mostly light honey comb and 17 overwintered colonies. As of Sept. 16 we collected data from 85 colonies. 12 were dead outs.

64 hives swarmed at least once.

27 hives swarmed at least twice

21 didn't swarm

No difference in swarming rate between new foundation, drawn comb or over wintered colonies.

No difference in ending condition - alive or dead or queenless between locations.

Mite counts in hives that never swarmed - 72

Mite counts in hives that swarmed at least once - 67

Average gain:

location 1 - 70

location 2 - 62

location 4 - 88

location 5 - 59

Location made a difference

Top 10% average weight per hive 210 lb.

Bottom 10% average weight per hive 110 lb.

Top 1/3 average weight per hive 184 lb.

Middle 1/3 average weight per hive 149 lb.

Bottom 1/3 average weight per hive 116 lb.

All hives had 75 lbs. equipment weight

Individual Colony Weights - Sept. 16, 2004

Top 1/3 - 184 lb.

Middle 1/3 - 149 lb.

Bottom 1/3 - 116 lb.

225	160 S	133 S
226 S	160 S	132 S
217	160 S	132 S
210 S	159 S	131
199 S	159 S	130
199 S	159 S	128 S
193 S	157 S	127
189	155 S	126 S
186 S	154 S	125 S
186 S	153 S	122 S
183 S	153 S	122 S
182 S	151 S	121 S
178 S	150 S	119 S
177 S	150 S	118 S
175 S	150 S	115
173 S	147 S	111 S
170 S	146	111 S
169 S	145 S	107
166	144 S	106 S
166 S	143 S	105
165 S	141 S	101
161 S	139	98 S
160 S	134 S	94 S
	134 S	89 S

*Subtract 75 lbs for equipment weight*