

DIY: Hive weighing scale

By Steve Davies

During winter preparations, our attention turns towards ensuring the bees have enough stores to last them through to Spring. Traditionally, beekeepers 'heft' their hives to assess the weight but this can be a bit 'hit or miss' especially if the beekeeper is in their first few years of experience.

A more reliable, and reassuring, method is to use scales to record the total hive weight. Often this entails weighing both sides of a hive and adding the totals to give an overall weight. Some of the more affordable scales do not last long and can give erratic readings.

I have a long-standing back problem which does not like lifting heavy hives whilst twisting to read the scale! A search on the Internet revealed the perfect scale which lifts the complete hive in one easy movement – watch it yourself on [Youtube](#).

Unfortunately, the 'inventor' lives in Croatia and when I last contacted him, he did not ship Internationally.

The next best, for me, is what I found in America on the site called "[Bee Hacker](#)". The beekeeper, Tom Rearick, is happy for others to use his design. I would recommend visiting both links but what follows is my interpretation of Tom's design.

Materials needed

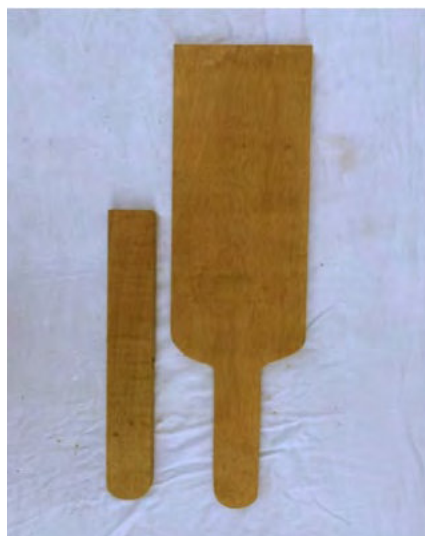
- 18mm thick plywood approximately 180mm x 300mm
- 2 x 100mm hinges
- 2 x angle brackets
- 3 x 150mm joining brackets
- 2 x corner repair plates
- 1 x good quality scale
- 1 x mini spirit level
- 1 x pulley wheel
- 1 x spool of wire rope
- 22 x M5 machine screws, washers and, preferably, nylon lock nuts
- 1 x eye bolt
- 1 x pronged tee nut and bolt

Method

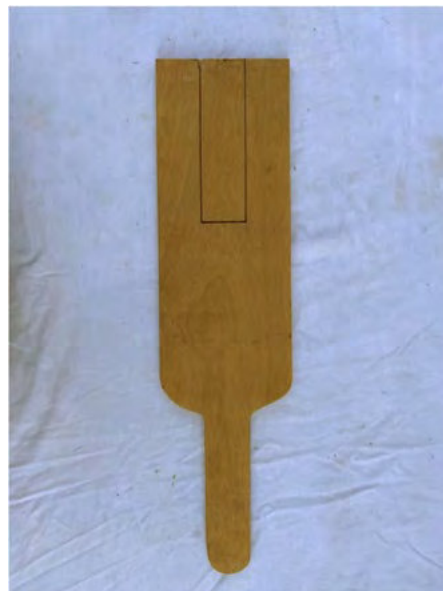
- First, cut a section of thick plywood approximately 600mm x 155mm. Divide equally into three parts, lengthways, and lightly mark with pencil. Measure down approximately 180mm from the top and mark across at right angles. Cut out the two outer pieces forming a paddle shape.
- On a separate piece of plywood, cut another piece approximately 400mm x 50mm. This will be the handle and needs to be the same width as the paddle handle.



The finished product is in residence at Slab Castle and I have the original. I also have a plywood 'template' should anyone be brave enough to try ...



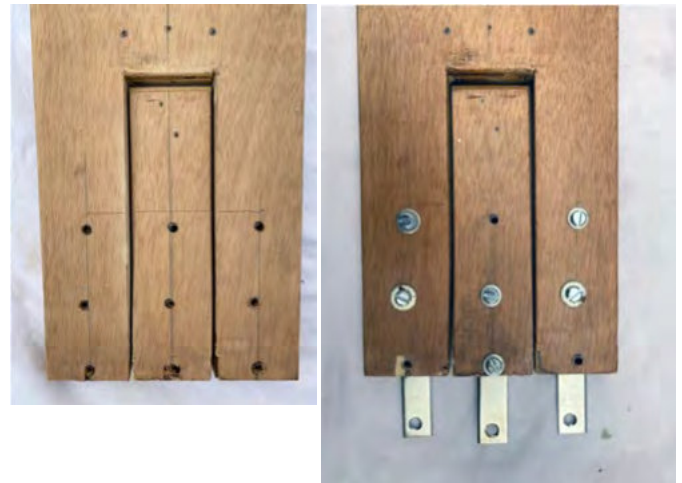
- NOTE: during construction I will use machine screws and standard bolts which are only hand tight. Once complete, I will then fit nylon lock nuts and tighten everything fully.
- Put the slim handle to one side for the moment. On the bottom edge of the main body, mark up approx 185mm but DO NOT CUT OUT.



- Position three 150mm mending plates centrally on each of the prongs; mark the screw holes and drill through.



this stage and paint/varnish all wooden components. Once done, fit the three metal mending plates to the underside of the paddle. Note the positions of the machine screws.



- Turn the board over and, on the top face, position both hinges. The lower hole of the bottom hinge needs to align with the top hole from the mending plate below. Apologies, it would be easier to understand if I had photographed the plates as well. Also, the top hinge is facing the wrong way but, hopefully all will become clear later. Mark the top edge of the middle prong just below the hinge body.

- Turn the board over and fit the two angle brackets into place aligning one of the holes directly onto the screw from the mending plate below. Make sure the brackets do not overlap the middle cut-out. Later, you will need to drill a second hole through the angle bracket and board to prevent twisting.



- Now, cut out the central 'prong'. The width of this needs to be reduced slightly as you do not want any binding when trying to lift. Also, round off the top edge for free rotation. NOTE: you may want to pause construction at

- Put the central 'prong' into position, secure the hinge at the bottom edge and mark all screw holes accordingly. Drill and screw the hinge to the paddle.



- Fit the remaining hinge to the handle you safely put to one side earlier ...



- Making sure both handles are in line, secure the lever handle to the paddle with the hinge on the underside.



- Next, you will need to dismantle a small pulley wheel. The wheel is the only part you need so carefully drill on the pin and discard all metalwork.



- The wheel will need to be fitted in line with the top hole of the angle brackets. You may need to drill the wheel slightly to accommodate the bolt and you will need to use your imagination for the spacers. I used offcuts from a metal net curtain pole but anything will do, just make sure the wheel can rotate freely.

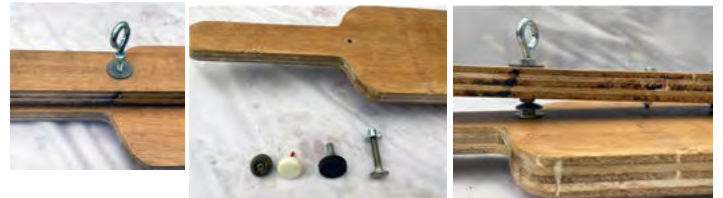


- The next stage is to add a stop bolt to ensure that you squeeze the handles the same amount each time you use the scales.

On the slim handle, drill a hole completely through and marking the paddle body. Thread a closed eye-bolt through the slim handle and secure with a nut on the underside. Cut off any protruding thread.

The nut needs to contact the paddle in a consistent manner and there are a variety of options available. The middle photo (left to right), screw on rubber foot, hammer on plastic foot, threaded foot from a discarded fridge, domed bolt and pronged tee nut.

I prefer the domed bolt method; drill a hole through the paddle in line with the eye-bolt, tap the pronged tee nut in place and thread through the domed nut. This gives a firm fixing yet allows you to adjust the gap between the handles to suit your grip.



- The scale is then connected to the eye-bolt using a short length of wire rope and secured with a wire clamp. Once you are satisfied with the position, fully tighten the wire clamp and wrap with tape to cover exposed wire etc. HINT – switch on the scale to ensure you connect it with the electronic readout facing you (one of my many Homer Simpson moments).



- Drill a small hole through the middle prong, just below the pulley wheel. Secure a long length of wire rope to the end of the scale again using wire clamps (as this takes a lot of weight, I would advise using two clamps for security).

Feed the wire rope over the pully and through the hole; loosen the nuts securing the metal prong slightly and



(this step continues on the next page)



wrap the wire rope around both bolts before tightening. You will need to test the operation under load and adjust the length of the wire rope to suit. You will be aiming for the handle eye-bolt/domed bolt to touch yet making sure the pulley wheel does not come into contact with the middle prong. Once satisfied, cut off the excess wire rope and again wrap the ends in tape.

NOTE: you will probably need to adjust again after a bit of use as everything settles into place...

- Test the unit under load and adjust if needed. Replace any 'ordinary' nuts with nylon locking nuts (alternatively, loosen each nut slightly, give a dab of Loctite 'Lock 'N Seal' then tighten fully). Cut off any exposed bolts and file down any sharp edges.
- Next, add a mini spirit level. Position it where it is easy to see and it really does make a difference to the readings!



- Finally, you will need to make a modified 'entrance block' to fit the back of the hive where you remove the varroa floor. Cut a piece of timber the same size as the gap then cut out a small section the same size as the metal prongs in the centre of one edge.



Using these scales is simplicity itself – remove the varroa floor, insert the modified entrance block, slide the scale prongs into the rebate as far as possible, squeeze the handles together and take the reading. The reading is then doubled to give you an estimate of the hive weight.

Although it won't give you a completely accurate figure, it will be consistent, and you'll be able to assess diminishing stores with each reading.

However, if you prefer to take readings from both sides and add together, you make a pair of thin 'entrance blocks' the length of the hive and place on each side under the floor.



Alternatively, cut a notch on the top faces of your hive stands for a permanent solution.

AMENDMENT

Although the above construction lasted a few years, I noticed that the angle brackets were bending towards the scales and giving false readings. Two solutions came to mind, either shorten the height of the brackets or add some supporting braces; I chose the latter.

- Using two corner repair brackets, fold over the bottom edge to provide a 'lip' (try to align the top hole of the bracket with the pulley wheel bolt). Cut out a notch to fit behind the pulley wheel bracket. You may also need to drill extra holes to fit the bolts.



- Remove the pulley wheel assembly and fit the support brackets in position. Fit the pulley wheel assembly then a second bolt to the support bracket ensuring it doesn't restrict movement of the middle prong.
- Once satisfied, screw the support brackets to the paddle board.



...and that's all there is to it, hope I didn't confuse you too much