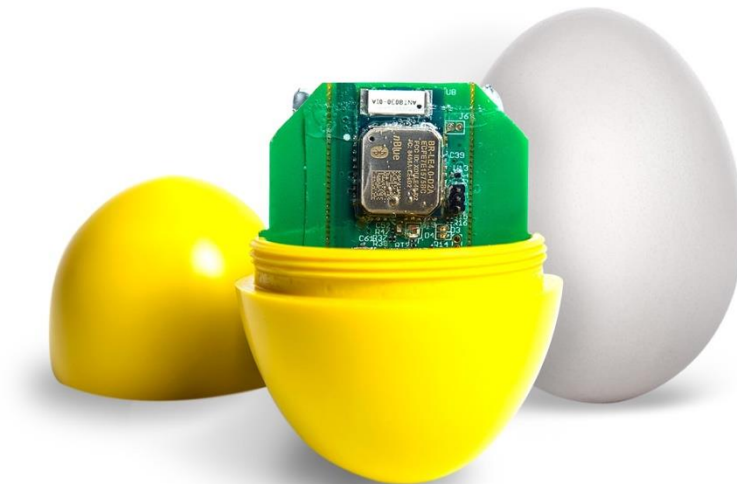


Monitoring on-farm egg impact to improve efficiency



February 2020

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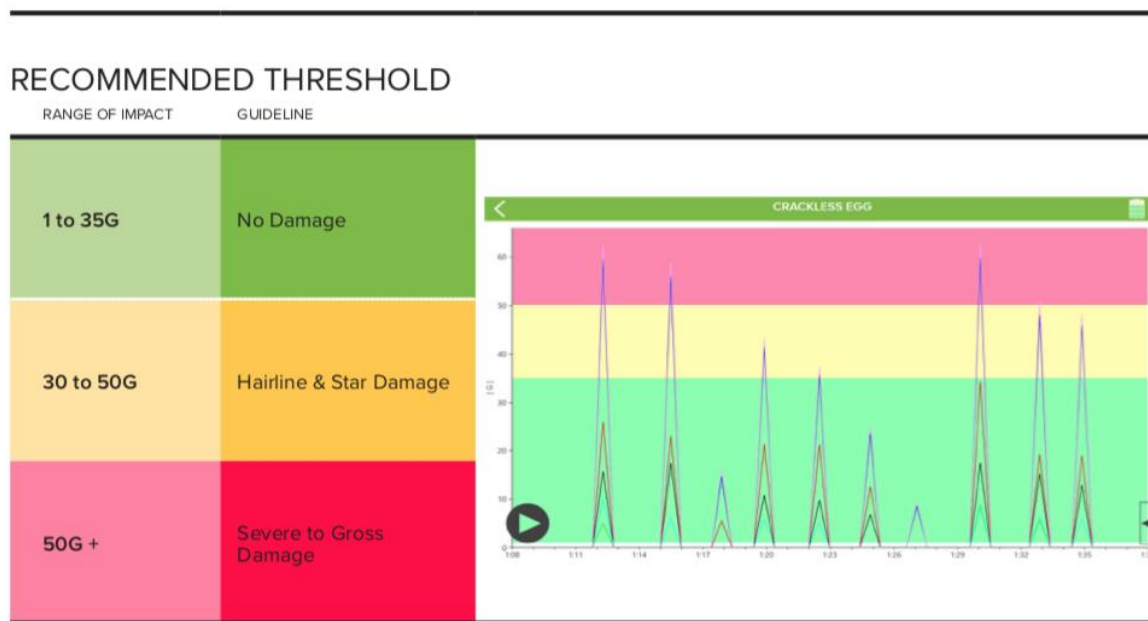
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Background:

Eggs are delicate. Cracked eggs, combined with eggs dirtied by cracked eggs on a transporting conveyor belt can contribute to a high percentage of eggs classed as seconds. Once eggs are damaged in this way, they are worth considerably less (between 60 – 80 pence per dozen less). It is, therefore, beneficial to prevent unnecessary damage to eggs during transportation from the laying nest box through to the packing machine.

Introduction:

To measure the potential avoidable damage, the CracklessEgg™ device was used in an on-farm exercise. The device is shaped like an egg which has multiple sensors within it that measures the impact of force an egg experiences through transportation. The device is linked via Bluetooth to an iPad to have realtime readings as the device is placed on the egg belt. The sensors measure in the unit of G; the force per unit mass to gravity. The level of G is rated to eggs as follows:



*Testing executed in a controlled environment using table eggs, in-line results may differ.

Table 1. (CracklessEgg™ Guide 2017, Version 2)

The aim of the exercise is to identify areas where impact could be reduced to minimise wastage and graded seconds, increasing egg sale income.

To achieve this aim, the CracklessEgg™ device was used on-farm to measure the impact from nest box to egg packer. Farming Connect's poultry demonstration site; Wern was the site chosen for this. It is important to note that, farmer, Osian Williams' egg graded seconds are of no concern as they are relatively low, at under 4%,

therefore, we anticipated limited improvements and rather, wanted to demonstrate the potential of this device. Nevertheless, Osian was still interested to use the 'Crackless Egg' to see whether there were any areas that could be improved to reduce his low levels of second graded eggs.

The CracklessEgg™ device used in this exercise was courtesy of Lloyds Animal Feeds who is the farm's feed and pullet supplier.



Figure 1. Osian Williams and Gwesyn Davies with the CracklessEgg™ device and iPad which are linked via Bluetooth



Figure 2. Inside the CracklessEgg™ device are sensors

Method:

The CracklessEgg™ device was calibrated before each use to ensure accurate readings. Osian Williams, Gwesyn Davies from Lloyds Animal Feeds and the Farming Connect Poultry Technical Officer met on farm to carry out the exercise. The device was then placed on the egg conveyor belt. At each transfer point, adjustments were made through either tightening of belts, levelling plates or adding plastic deflectors. The device was then placed a second time on the same points to measure improvements made.

Results:

An initial run of the CracklessEgg™ on the egg belts, transfer belts and the packing system was carried out on 5 February 2020 to gather a baseline of impact on eggs. Birds were 53 weeks of age on this date. Due to real-time results being available on the iPad, some adjustments were made during that day.

The process was then repeated again approximately three weeks later on 24 February when birds were 56 weeks of age. Note, eggs were slightly larger and potentially more susceptible to cracking.

Area 1 - Egg belt to first transfer point



Figure 13. Device on first transfer point

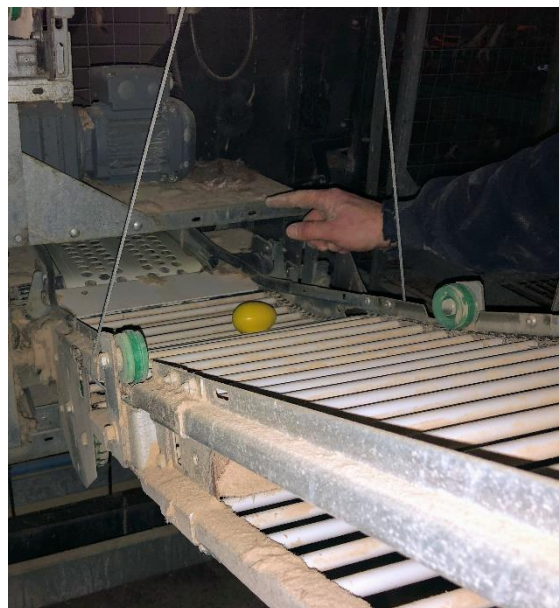


Figure 4. Device on first transfer point

The CracklessEgg™ was placed on the egg belt and moves through the transfer onto the second belt where it rises to the cross transfer. This was done multiple times to gather a representative reading. The CracklessEgg™ measures the force in real time to gauge where issues are.



Figure 5. Results on first transfer point

The initial reading showed up to 60 (G) which indicates an area where shell cracking could occur. Issues that can cause this are that the angles of the join are too high, a sagging or uneven belt, or too high belt speed. It was felt in this situation that the angle was correct, however, there was too much sagging on the belt. This was tightened manually resulting in a reduction in the reading.



Figure 6. Sag in belt on transfer point 1



Figure 7. Osian tightening the belt

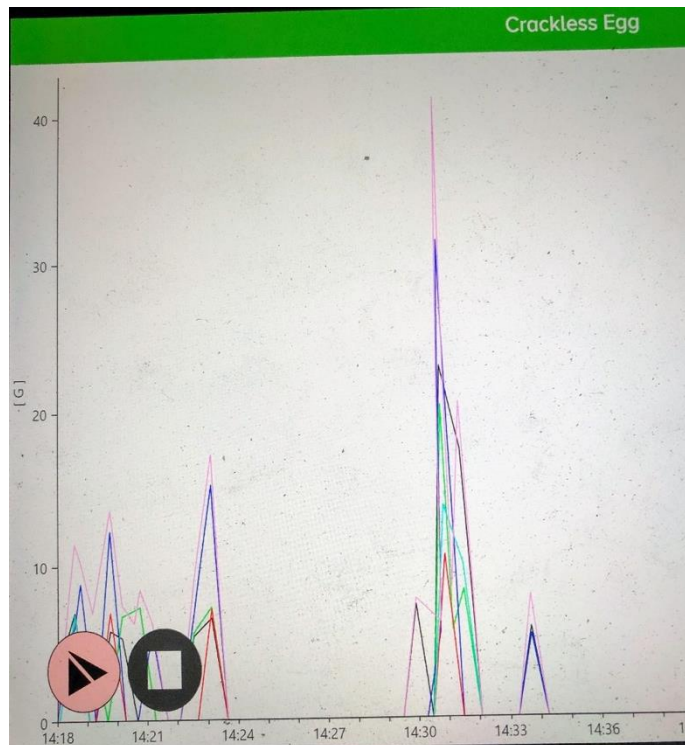


Figure 8. Results on transfer point 1 following first adjustments

The second reading showed a reduction to 40 (G) due to tightening the belt manually. It was felt that this reading could be reduced more by removing one of the links from the belt which Osian will do after the visit.

On 24 February, a second visit with the CracklessEgg™ was carried out after Osian had made a few more minor alterations, including removing one of the links from the belt as was previously recommended. This resulted in a decreased impact to eggs of approximately 20 (G).



Figure 9. Results on transfer point 1 following second adjustments

Area 2 - Transfer belt to cross transfer into packing area



Figure 10. Device on second transfer to cross transfer



Figure 11. Plastic deflector positioned to reduce impact

This area was tested second on 5 February, however, there were no issues on the transfer between the transfer belt to the cross transfer into the packing area. We tested another section of the belt on our second visit on 24 February and identified one area where improvements could be made. This was improved by placing a plastic deflector on the belt to reduce the impact.

Area 3 - Egg packer machine

The CracklessEgg™ showed that there were some areas for concern where the eggs moved into the separator due to banging. Osian replaced the dividers with slightly narrower ones which reduced the impacts. He also ran the belt at a slower speed

(which he would do normally) and this also reduced the spike levels to acceptable (20-30 (G)).

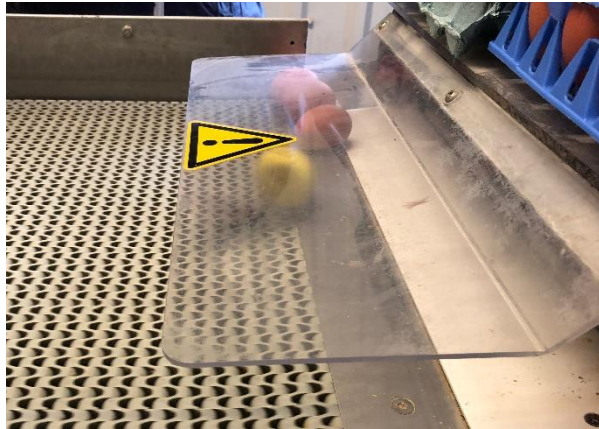


Figure 12. Device on egg packer



Figure 13. Device on egg packer

Area 4 Egg packer – tray transfer

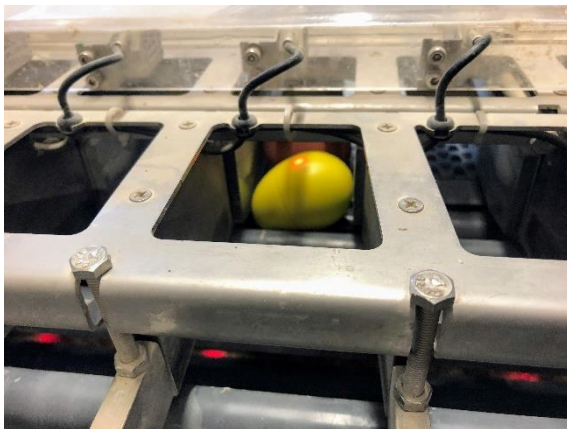


Figure 14. Device at tray transfer



Figure 15. Device in tray post transfer



Figure 16. Device in tray post transfer with stamp

When the CracklessEgg™ went through the packing area and machine it showed no areas of concern and the real-time data showed acceptable levels of stress which would not result in cracking, therefore, no further alterations were required at this area.

Summary:

The CracklessEgg™ was a useful tool to identify areas for improvement on the egg conveyor belt, particularly at transfer points. The device was easy to use and alterations can be made immediately due to the real-time data feature offered by the device.

Based on an average graded egg price of approximately 86p per dozen, 1% seconds would equate in monetary value to 0.655p/doz. If each bird lays 26 dozen eggs, 1% seconds is equal to 17p per bird which over a 32,000 bird unit would mean a saving of £5,449.60 per flock. There may also be some additional savings to be made in the form of wages due to time saved grading eggs on-farm from less downtime for clean-up.

Below are scenarios of how improving graded seconds by between 1 – 3% can equate to financial savings. The scenarios also include varying graded egg sizes and are all based on a 32,000 bird unit.

Size	Very Large	Large	Medium	Small	Graded Seconds	Av Graded Price
%	4.00%	42.00%	45.00%	5.00%	4.00%	
Price	98	98	83	22	10	84.16

Size	Very Large	Large	Medium	Small	Graded Seconds	Av Graded Price	32k Birds
%	4.25%	42.25%	45.25%	5.25%	3.00%		
Price	98	98	83	22	10	84.81	5444.40

Size	Very Large	Large	Medium	Small	Graded Seconds	Av Graded Price	32k Birds
%	4.50%	42.50%	45.50%	5.50%	2.00%		
Price	98	98	83	22	10	85.47	10888.80

Size	Very Large	Large	Medium	Small	Graded Seconds	Av Graded Price	32k Birds
%	4.75%	42.75%	45.75%	5.75%	1.00%		
Price	98	98	83	22	10	86.12	16333.20

This exercise has demonstrated that by using a tool such as the CracklessEgg™ device to identify high impact areas and then making small changes to these areas to reduce the level of seconds will create a considerable financial saving.

Observations:

- The device allows the farmer to identify key points in real-time that could potentially be causing cracks, and to manually rectify them if possible and re-test in real-time to see if it has worked.
- Simple adjustments can be made to reduce impact on the eggs. Examples of adjustments made during this exercise included tightening belts, reducing conveyor speeds, levelling transfer plates and adding plastic deflectors.
- By tightening the belt on the first transfer point, impact on eggs was reduced from approximately 60 (G) to 20 (G).
- Reducing the belt speed can reduce impact on eggs from a 50 (G) spike to 20-30 (G).
- Belt speed plays a big part in damage and hairline fractures, see table 2 below. Speed is often turned up at the end of the day in sheds as egg collectors want to get them through quicker as there are less eggs coming through, but this is when cracks and damage are most likely to occur.
- The device was very easy to use and as the Bluetooth feature offered real-time data collection during the device being placed on belts, it allows alterations to be made at the time of testing and the benefits of those alterations were demonstrated immediately.
- This tool is useful to all egg producers, but particularly to egg producers experiencing high percentages of seconds from their egg grading feedback. A high percentage of seconds on the egg grading feedback could be, for example, over 6%.

RECOMMENDED THRESHOLD



*Testing executed in a controlled environment using table eggs, in-line results may differ.

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Table 2 (Crackless Egg Guide 2017, Version 2)



Similar crackles egg devices are available. If you are interested in using this or a similar device on your egg unit please email cath.price@menterabusnes.co.uk with your name, farm name and postcode.

Figure 17. Osian and Gwesyn measuring impact of force at one of the transfer points



Figure 18. Osian and Gwesyn measuring impact of force at one of the transfer points