

Stage Two: Agricultural Production

AT3: External Assessment

- Production Investigation into egg laying in older hens.**

Word count: 2029

Production Plan

Introduction:

The purpose of this investigation is to explore what improves the size of eggs in laid by older free range hens. Around 17 million eggs are consumed every day in Australia and farmers produce around 6.22 billion eggs each year or 518.1 million dozen eggs (Australian eggs, 2021). Egg production by free ranged hens is very popular by consumers as people are becoming more concerned about the welfare of the hens. Small commercial farmers in this industry are struggling to compete against the larger producers as layer scaled producers are able to produce eggs at a lower price than the smaller producers therefore becoming favoured by the buyers (Poultry Hub, 2021). By Purina mills tips, to help produce good quality eggs in weight and shell strength 90 percent of the chicken's diet should include high quality layer feed, gather eggs 2-3 times a day and provide light for at least 17 hours per day (Mikelle Roeder, 2021). Healthy diet feeds that can be included as well as pellets are sardines, mealworms and cuttlefish with help strengthen the shell, production of eggs and animal health. The average age of commercial layers is up to 72 weeks old which is nearly a year and a half and will produce an average of 300 eggs each year (RSPCA, 2021). The most common chicken breeds for layers in commercial farming in Australia are Isa Brown, Hi-Sex brown and Hy-Line brown (F, 2021). As layers get older their egg production rates will drop slowly but still be at their largest in size as the size of eggs increase throughout aging of the hen (Biggs, 2018). This is why older hens should be considered in commercial farming as larger eggs are produced rather than younger hens with a good diet to keep eggs at a high quality in weight size.

The goal for this production investigation is to produce quality eggs from old laying hens by creating a good diet through high quality feed and healthy treats. I am aiming for high quality eggs based on weight in the large size which is eggs with the weight of 55g.

Procedure:

Resources

- 6 three-year-old Isa Browns hens: all healthy and still laying
- Chicken coop and yard 9m x 9m (81m²) plus free range of yard around house exceeds minimum requirement of 1m² for chickens (Australian Government, 2021)
- Water trough
- Pellet feeder with weight activated lid lift
- 10 nests and roost
- Barastoc Champion layer pellets
- Scraps provided daily
- Healthy treats including meal worms, sardines and cuttlefish provided weekly
- Scales

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499 words

Management plan

Week 1	Hens will be fed Barastoc laying hen feed, healthy treat for week is sardines. Will check daily and data from eggs will be collected throughout the trial
Week 2	Stay on same feed but different treat of dried mealworms.
Week 3	This week's treat will be cuttlefish.
Week 4	Week's treat of dried mealworms.
Week 5	Feed healthy treat of sardines.
Week 6	Last week. Feed treat of cuttlefish check and collect eggs.

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Financial plans: (503 words)

Gross Margin

Income		
Egg value- extra-large	60g per egg @ \$4.50 per dozen	\$31.5
- large	55g per egg @ \$4 per dozen	\$28
- medium	50g per egg @ \$3.50 per dozen	-
- small	40g per egg @ \$3 per dozen	-
Total Income		\$59.50
Expenses		
Feed (champion pellets)	\$29.99 per bag	\$29.99
Dried Mealworms	\$12.95 80kg bag (8.5kg used)	\$1.38
Sardines	4 tins @ \$1.90 each	\$7.60
Water	\$3.50 per kL (0.0005kL a day each (Smith, 2020))	\$0.07
Cartons	Free as donated	-
Total Expenses		\$39.04
Gross Margin		\$20.46

Weights- (Australian eggs, 2021)

Prices- (Woolworths, 2021)

Amount of eggs were estimated to approximately their daily production and sizes then multiplied by days of trial.

Marketing

I am not selling my product of the eggs as I am not registered to sell. I will find the value of the eggs and the percentage of the sizes so I will be able to work out if there would be a profit if I was to sell the eggs. Large eggs are what I am aiming for which have to be around 55g in weight. Before selling eggs they would need to be separated into the sizes and stamped to show when they were collected. This is so the customers are able to judge whether they want the eggs depending on the date they were collected. This is all commercial practice.

Risk Management:

The largest risk for my chickens is death by heat. I will make sure to keep chickens as cool as possible and that they have lots of accessible water to drink from. I will watch to make sure there are no signs of illness and try to reduce impacts of heat as much as possible by sourcing cold water, ice and air flow.

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			Consequences				
			1 – Insignificant Dealt with by in-house first aid, etc	2 – Minor Medical help needed. Treatment by medical professional/hospital outpatient, etc	3 – Moderate Significant non-permanent injury. Overnight hospitalisation (inpatient)	4 – Major Extensive permanent injury (eg loss of finger/s) Extended hospitalisation	5 – Catastrophic Death. Permanent disabling injury (eg blindness, loss of hand/s, quadriplegia)
Likelihood	A -	Almost certain to occur in most circumstances	High (H)	High (H)	Extreme (X)	Extreme (X)	Extreme (X)
	B -	Likely to occur frequently	Moderate (M)	High (H)	High (H)	Extreme (X)	Extreme (X)
	C -	Possible and likely to occur at some time	Low (L)	Moderate(M)	High (H)	Extreme (X)	Extreme (X)
	D -	Unlikely to occur but could happen	Low (L)	Low (L)	Moderate(M)	High (H)	Extreme (X)
	E -	May occur but only in rare and exceptional circumstances	Low (L)	Low (L)	Moderate (M)	High (H)	High (H)

WHS: RISK ASSESSMENT

RATING: 2D Low. I selected this risk rating because I have experience in handling chickens and working with them. There is also a very low chance of being seriously injured throughout this investigation but in case there will be people I can easily contact or get in emergencies.

Quality assurance

My goal is to have my chickens laying everyday good quality eggs in the large size categories so they would be suitable to sell and at a good price. I am hoping the quality diet will help me achieve this goal.

Most likely hazards	Standard Operating Procedure	PPE & other safety equipment required
Injuries from handling feed bags	Use sack truck if too heavy and when carrying use knees, turn full body not twisting hips	Boots, sack truck
Salmonella	Wash hands before and after handling chickens.	Soap and water, hand sanitiser

Ethics

Chickens welfare will be considered and their health will be checked frequently. Their food and water access will be checked regularly to make sure everything is working like feed lid and food and water is filled when necessary. Having this feeder will ensure the feed won't get wet from rain.

Their nesting area inside the shed is vented so that it will keep the sheltered area as cool as possible in the heat so chickens don't overheat. Industry standards are used to strengthen food safety and animal safety. These standards are considered for the health of others to avoid sicknesses (Plowman, 2018).

Word count 247

Production Report (246)

Results:



Image 1 - two of six chickens



Image 2 - eggs in laying nest for hens



Image 3 - roost and nests in protected shed

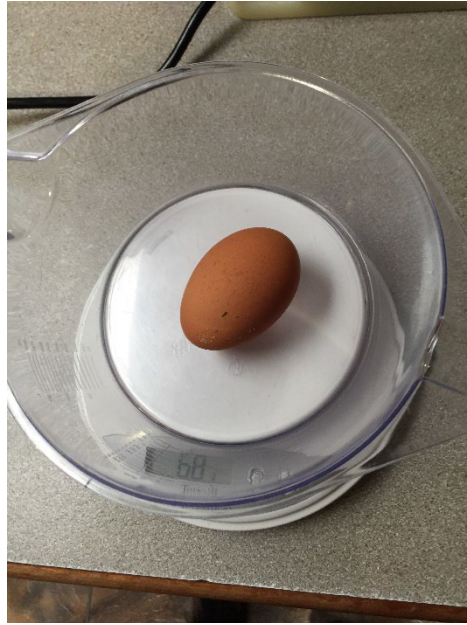


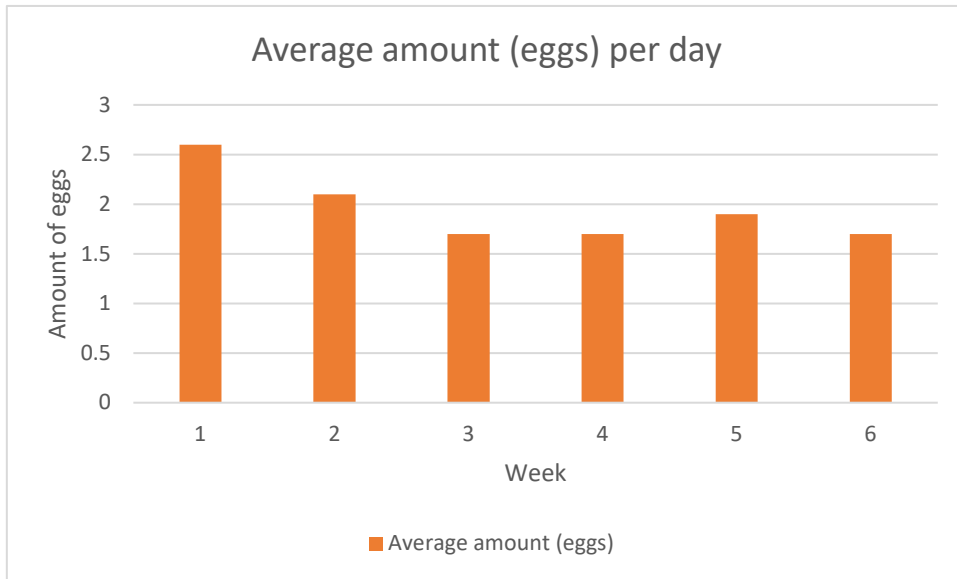
Image 4 - egg being weighed

Table 1- averages of egg amount and weight per week

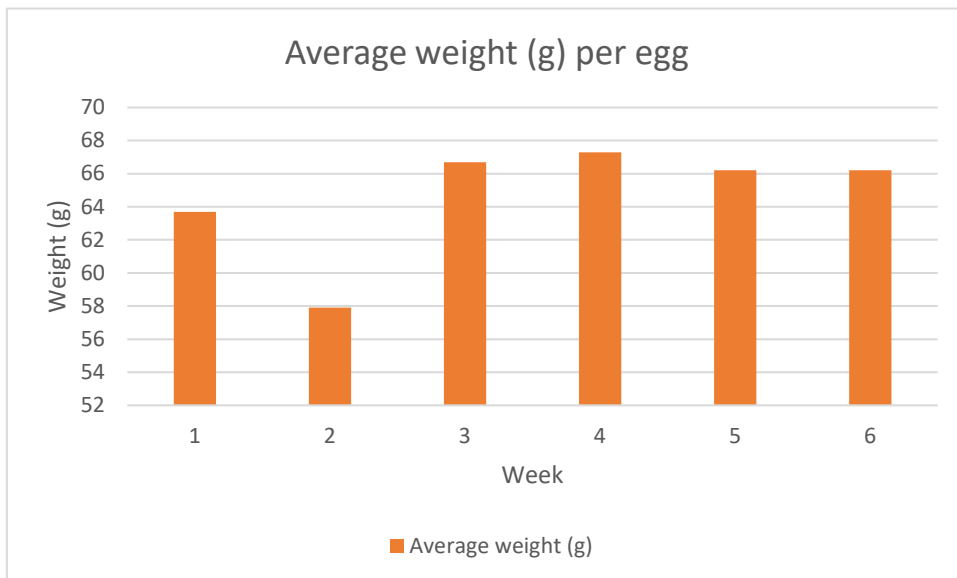
Week	Average amount (eggs) per day	Average weight (g) per egg
1	2.6	63.7
2	2.1	57.9
3	1.7	66.7
4	1.7	67.3
5	1.9	66.2
6	1.7	66.2
Total average	2	64.7

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Tables are **not** included in the word count



Graph 1- average of egg amount per week



Graph 2- average weights of eggs per week

Results show that week one has the highest average amount of eggs collected and week 4 has the highest average weight of the eggs collected. (25)

Table 2- average amount of extra-large and large eggs per day for each week

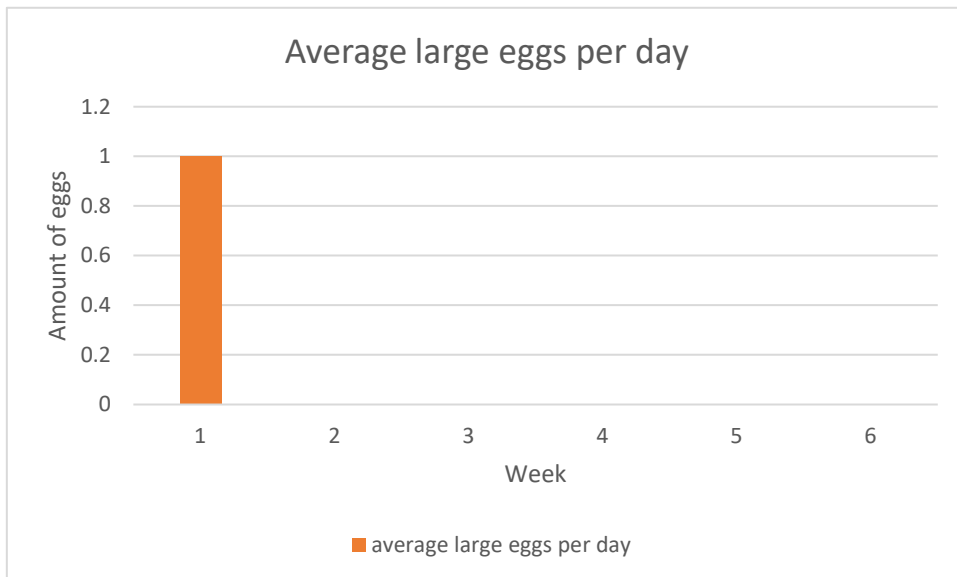
Week	Extra large	Large
1	2	0.6 = 1
2	1.7 = 2	0.3 = 0
3	1.6 = 2	0.1 = 0
4	1.7 = 2	0
5	1.7 = 2	0
6	1.7 = 2	0

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Graph 3-Average amount of extra-large eggs per day each week



Graph 4-Average amount of large eggs per day each week

Results show that all weeks had the average of large sized eggs collected and only week one had the average of 1 extra large egg size collected. (27)

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in the word count.

Financial records:

Income		
Egg value- extra-large 60g	69 x eggs @ \$4.50 per dozen	\$25.88
- large 55g	7 x eggs @ \$4 per dozen	\$2.33
- medium 50g	0 x eggs @ \$3.50 per dozen	-
- small 40g	0 x eggs @ \$3 per dozen	-
Total Income		\$28.21
Expenses		
Feed (champion pellets)		\$29.99
Dies Mealworms	\$12.95 80kg bag	\$1.38
Sardines	4 tins @ \$1.90 each	\$7.60
Water	\$3.50 per kL (0.0005L a day each)	\$0.07
Total Expenses		\$39.04
Gross Margin		\$10.83

Table 3- financial records including cost, income, profit and loss

Analysis:

The production goal to produce high quality eggs in weight from old laying hens was successfully met with most in the extra-large or large size. Included in this goal was to find the most successful diet for the hens helping achieve these high quality eggs. This side of the goal was less successful with unreliable factors interfering the investigation including crows eating eggs and two hens dying of old age affecting amount of eggs collected.

Results shown in graphs 1 and 2 show that the diet achieving the best egg quality in weight was sardines with the pellets as they had a high average whereas, mealworms had the highest average weight in week 4 but the lowest in week 2. These results also showed that the diet influencing the highest production rate was sardines also meaning sardines were shown to be the best additional treat for the week as well as the pellets and scraps. This could be as chicken love the taste of sardines making the eager to eat, they contain a great source of protein and omega3 fatty acids (Susan, 2020). Results shown in graphs 3 and 4 show that each week no matter the feed given there was an average of one extra-large egg per day and week 1 was the only week that had an average of one large egg per day. This could mean that one of the chickens that died later in the investigation may have been laying smaller eggs than the rest in the first week of the investigation.

Income for each hen was found to be an average of \$5.64 which is above the income from selling a dozen extra-large eggs. The loss per hen is on average \$2.17. Financial records show the loss through this investigation instead of profit as there are only four chickens in the end producing these eggs where having more chickens will have higher production meaning more income produced. The expenses towards the chickens for their welfare and production including feed and water is higher than it normally would for commercial laying farms. This is as expenses include the multiple feeds given for this investigation of mealworms and sardines which wouldn't be normally given to chickens in commercial farming. But expenses would still be higher than income creating a loss for this investigation.

Evaluation:

The investigation design was well designed and conducted with ease in completing the practical side of the investigation while collecting data throughout the weeks. The only negatives were the death of two chickens caused by their old age and crows eating some eggs during the day when not being checked. The unexpected loss was influenced by the death of the two chickens and money spent on extra feed when a smaller loss was expected during this time period. These unexpected issues would have affected the data by lowering average of eggs collected as data was collected on the 6 chickens at the beginning of the investigation and then changed to 4 chickens. Crows would have also lowered these numbers as data was not collected on those missing eggs.

Industry standards for laying hens were used for the chickens so there are no ethical issues and good animal welfare. Limitations of this investigation was the amount of time to conduct this investigation only allowing each diet to be tested twice. If different diets were tested more times the results would be more reliable. There were limitations on scale as only 6 three year old Isa Browns hens; all healthy and still laying were able to be used as other hens were younger or a different breed, creating difference in variables. If more of these hens were used there would be a large sample size to collect data from creating more reliable result.

To improve these limitations and issues in this investigation more hens can be used to investigate these different healthy diets and how they affect the quality of their eggs. Longer testing time will allow the different diets to be investigated more increasing data collection on weights and amount of eggs collected. These improvements in the investigation will create more reliable results and can be observed and compared to data collected in this investigation.

Conclusion:

Through this investigation it was found that the healthy treat of sardines created the best eggs in size with the highest average eggs collected in the weeks and egg weight, showing that sardines could be included in laying hens diets helping the production of eggs in old hens. Farmers can learn from this investigation that they can still use older hens and include some of these healthy foods in their diet to help keep them producing large sized eggs but because of the cost of sardines meaning that will need to be considered in productivity. (798)

Total Word count for Analysis, Evaluation and Conclusion is 798.

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Appendices:

Week	Day	Amount	Weights (g)	Extra large	Large	Non-sellable
Wk 1	Monday	3	70, 58, 70	2	1	-
	Tuesday	2	76, 74	2	-	-
	Wednesday	3	58, 70, 64	2	1	-
	Thursday	3	66, 76, 68	3	-	-
	Friday	2	68, 58	1	1	-
	Saturday	2	70, 58	1	1	-
	Sunday	3	74, 72, 66	3	-	-
Wk 2	Monday	3	64, 66, 66	3	-	-
	Tuesday	1	56	-	1	-
	Wednesday	3	70, 66, 68	3	-	-
	Thursday	2	64, 68	2	-	-
	Friday	2	58, 18	-	1	1
	Saturday	1	66	1	-	-
	Sunday	5	74, 66, 60	3	-	-
Wk 3	Monday	2	68, 68	2	-	-
	Tuesday	1	66	1	-	-
	Wednesday	3	72, 72, 64	3	-	-
	Thursday	1	70	1	-	-
	Friday	1	70	1	-	-
	Saturday*	2	64, 66	2	-	-
	Sunday	2	56, 64	1	1	-
Wk 4	Monday	1	70	1	-	-
	Tuesday	3	72, 62, 70	3	-	-
	Wednesday	1	66	1	-	-
	Thursday	2	74, 60	2	-	-
	Friday	2	72, 60	2	-	-
	Saturday	2	66, 62	2	-	-
	Sunday	1	74	1	-	-
Wk 5	Monday	1	66	1	-	-
	Tuesday	3	62, 68, 70	3	-	-
	Wednesday	1	72	1	-	-
	Thursday	4	64, 72, 62, 64	3	-	-
	Friday	2	60, 64	2	-	-
	Saturday	0	-	-	-	-
	Sunday	2	64, 72	2	-	-
Wk 6	Monday	1	70	1	-	-
	Tuesday	1	68	1	-	-
	Wednesday	2	64, 70	2	-	-
	Thursday	0	-	-	-	-
	Friday	3	70, 66, 64	3	-	-
	Saturday	3	60, 64, 72	3	-	-
	Sunday	2	60, 66	2	-	-

*hen died of old age

Table –all data collected for egg weights

Size	Total size amount	Total income
Extra large	69	\$25.88
Large	7	\$2.33
	TOTAL \$	\$28.21

Table – egg size total cost

Appendices Table and References are **Not** included in the word count.

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