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Dissemination of Cocoa Research Institute of Nigeria Technology Through Inclusion of Cocoa Pod Husk in Poultry Feed to Substitute for Some Quantity of Maize in Adopted School

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Abstract

One of the major objectives of Cocoa Research Institute of Nigeria (CRIN) is to investigate the effective utilization of the crops, by-products and the feasibility of small- scale production of such end-use product. Based on this objective, CPH is one of the major by-products of cocoa and has been utilized effectively by CRIN in the inclusion of poultry feeds. The adopted school's concept was a collaboration between Agriculture Research Council of Nigeria (ARCN)/West Africa Agricultural Productivity Programme (WAPP) and CRIN. The poultry project in the school is to encourage secondary school students to develop interest in agriculture and encourage teachers to practice agriculture before and after retirement. This technology was disseminated to CRIN adopted school in feeding the birds. The inclusion of CPH in layers mash has reduced the quantity of maize by 20%. This was demonstrated by feeding equal numbers of birds with the conventional feed (controlled) and CPH fortified for 16 months (experimental). The result revealed that about ₦460 was saved on every 25kg of feed fortified with CPH compared to conventional feed with almost the same production result. This has brought a significant drop in amount spent on CPH fortified feed compared to the conventional feed thereby increasing the farmers profit.

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However, some challenges such as theft and transportation restrictions during the COVID-19 lockdown were experienced. It can be concluded that inclusion of CPH reduce the production cost and increases the farmers income.

***Keywords*:** farmers; students; CPH; adopted school; covid-19.

1. Introduction

Cocoa-pod husk (CPH) is a by-product of the cocoa harvesting industry and it forms about 80% of the cocoa fruit. It is essentially a waste product except for the negligible amount used in the manufacture of local soap and feeding of livestock [1]. CPH is usually an under-utlized agro-waste from cocoa commercial farm, which could serve as good nutritional source for monogastric animals [2]. It is estimated that 0.8 to 1.0 million tons of CPH is generated annually in cocoa farms in Nigeria [3]. CPH is an agro-based by-product which may be incorporated into layers diets to reduce the maize requirement. Very little of the potentials locked up in this by-product have been exploited [4]. Studies conducted in Nigeria have shown that crushed CPH could be incorporated into livestock feeds.

The inclusion of CPH in layers mash will reduce quantity of maize by 20%, thereby reducing the cost of maize that is soaring. The increase in the price of conventional feed ingredients constitute the primary cause of the rise in animal feed production cost and the subsequently making animal protein cost very high [5]. The replacement of one or more major ingredients in conventional feed will reduce drastically the production cost of animal feeds thereby increasing assses to animal protein [5]. According to [6] CPH contains protein, energy and fibre which has gained considerable interest as livestock ingredients in Nigeria owing to availability and lack of large scale commercial application.

Commercial poultry production, provides easily accessible and affordable meat and eggs. About 80% of the world population get most of their basic nutrients like proteins, fats and vitamins from meat and eggs [7]. Presently, in Nigeria and other developing countries, despite the recent relatively rapid expansion in the livestock industry, protein consumption is 75% below the FAO requirement [8]. A high cost of animal production, gives rise to a high cost of animal protein thereby reducing the affordability of animal protein. Therefore, reducing the cost of animal production by using by-products from crops will greatly increase the affordability of animal protein.

Maize being one of the major ingredient in feed making is faced with allot of challenges now during production, ranging from the disastrous effects of army worms, destruction of several maize farms by grazing cattle, farmers-herders' clashes, effect of climate change which brings about crop failure and so on. These factors have increase rapidly the price of maize which is the major ingredient in poultry feed. Furthermore, there is need for maize to be substituted by CPH which is almost free. The outbreak of army worm in maize has really jerked up the prices of corn. Armyworm was observed at the onset of the cropping season in 2017. The new pest caused significant damage to maize crop whose demand for higher yield increases yearly due to rising population and urbanization, as well as the growing poultry, and fish sectors of the economy [9].

Furthermore, the adopted school concept has initiated by Agricultural Research Council of Nigeria (ARCN) in collaboration with Cocoa Research Institute of Nigeria(CRIN). West African Agricultural Productivity Programme(WAAPP) embraced the idea and used it to reposition technologies development and dissemination in all research institute in the country. Establishment of different intervention project like poultry, fishery, arable crop production and so on were implemented. The major purpose of these projects is to disseminate developed technologies in research institute to encourage youth in agriculture. On this back drop, inclusion of CPH to replace 20% maize was carried out by CRIN.

1.1 Specific objectives

- Encourage the inclusion of CPH in poultry feed formulation by farmers.
- Encourage secondary school students to have interest in agriculture from their youthful age.
- Increase the income of farmers by reducing cost of poultry production.
- Encourage secondary school students and teachers to be job creators.

2. Methodology

The study was carried out in Mamu Comprehensive High School, Ijebu North Local Government Area in Ogun state.The location of the school falls within 5km range as stipulated by ARCN.

Mamu Comprehensive High School was purposively selected because of proximity and interest to participate in the project in order to enhance adoption. The junior and senior secondary school Agricultural students from the chosen school were the target audience. The Agricultural science teachers also participated in the project.

Eighty (80) point of lay birds (18 weeks) Bovan Brown breed were stocked in two different cages of 40 birds per cage. They were fed with conventional feed till 20 weeks to attain optimum laying capacities. After which the two categories of birds were fed differently with CPH fortified feed and the conventional feed. Data were taking daily on egg laid, feed consumption, and vaccination in both categories. The result gotten were explained using graph, tables and charts.

2.1 Processing of CPH

Disease free and fresh cocoa pod were harvested, they were broken by the use of club, cocoa beans and placenta were removed. The husks were chopped into smaller sizes to allow easy drying.

The husk was sundried to a moisture content of about 10%. The husks were reduced to smaller pellets and were well grinded and stored on wooden pallets until it was being used.

3. Results and Discussion

Table 1: Feed formulation table for the conventional feed and CPH fortified feed.

S/No	Ingredient (conventional)	Percentage	Ingredient (CPH fortified)	Percentage
1	Maize	45	Maize	36
2	**CPH**	-	**CPH**	**9**
3	Soya meal	10	Soya meal	10
4	Wheat offal	12	Wheat offal	12
5	Limestone	8.6	Limestone	8.6
6	Bone meal	2.0	Bone meal	2.0
7	PKC (Palm kernel cake)	6.5	PKC	6.5
8	Groundnut cake	15	Groundnut cake	15
9	Premix	0.25	Premix	0.25
10	Toxin binder	0.15	Toxin binder	0.15
11	Salt	0.3	Salt	0.3
12	Super liv	0.05	Super liv	0.05
13	Lysine	0.15	Lysine	0.15

Source: field survey, 2021

The table 1 above shows the feed formulation for both conventional and CPH fortified feed. It can be observed that 20% (0.2 x 45= 9) of the maize in the convectional feed was replaced by CPH in the fortified feed.

3.1 Calculation based on price differences between conventional feed and CPH fortified feed

Table 2: Analysis of maize quantity in 25kg layers mash.

Cost price layer mash per 25kg (₦)	Price of maize per kg(₦)	Percentage of maize in 25kg mash	Price of maize in 25kg mash	Price of maize in 25kg mash minus other ingredients
4,900	220	45/100 x 25= 11.25	220 x 11.25= 2,457	4,900- 2,457= 2,425
		CPH fortified feed(20% maize substitute with CPH)		
Cost price layer mash per 25kg (₦)	Price of maize per kg(₦)	Percentage of maize in 25kg mash (20% maize substitute with CPH)	Price of maize in 25kg mash minus 20% maize	Price of CPH fortified feed after substituting 20% maize with CPH
4,900	220	20/100 x 45 =9 9/100 x25= 2.25	2.25 x 220= 495	4,900- 495 =4,405

The table 2 shows a price reduction of 495 naira per 25kg of layers mash after substituting 20% maize with CPH. So, instead of purchasing a 25kg layer mash bag for 4,900 naira, it will only be purchased for 4,405 naira. This means that poultry farmers were able to realize 495 naira per 25kg of layers mash fortified with CPH compared to the prevailing price of 4,900 naira for the convectional feed.

Table 3: Egg production record for both conventional and fortified feed with CPH.

s/no	Month	No of bird fed with conventional feed(control)	No of egg laid per month	No of bird fed with CPH fortified feed (fortified)	No of egg laid per month	Total no of bird	Total of egg laid
1	November, 2019	40	31	40	30	80	61
2	December, 2019	40	392	40	390	80	782
3	January, 2020	40	770	40	769	80	1,539
4	February, 2020	40	885	40	884	80	1,769
5	March, 2020	40	770	37	760	77	1,530
6	April, 2020	37	602	36	598	73	1,200
7	May, 2020	37	450	36	446	73	896
8	June, 2020	37	535	36	534	73	1,069
9	July, 2020	33	329	35	330	68	659
10	August, 2020	33	558	35	562	68	1,120
11	September, 2020	33	671	35	679	68	1,350
12	October, 2020	33	810	35	825	68	1,635
13	November, 2020	33	669	33	667	66	1,336
14	December, 2020	33	340	31	330	64	670
15	January, 2021	33	225	31	218	64	443
16	February, 2021	33	635	31	628	64	1,268

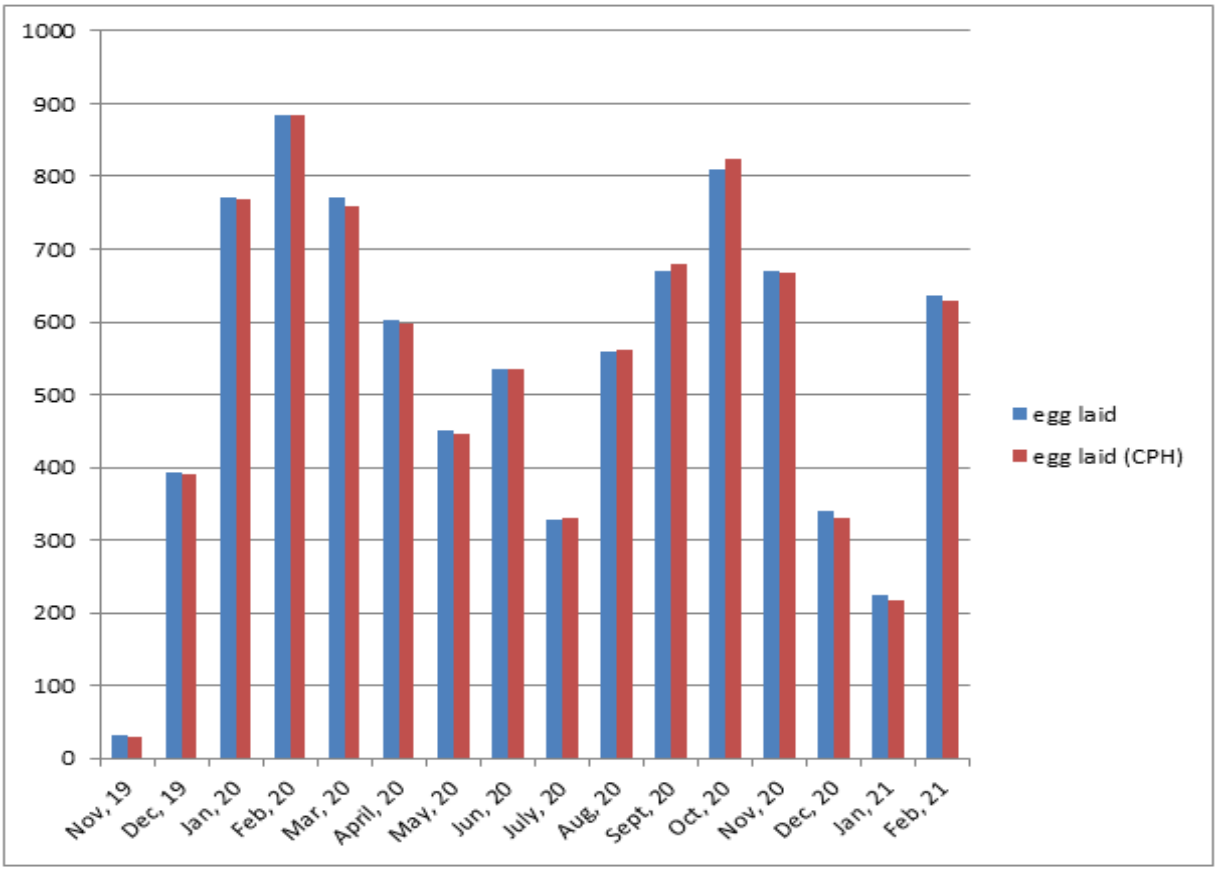

Figure 1: Bar chart showing the eggs layed by birds fed with convectional feeds and CPH fortified feed.

Source: field survey, 2021

The figure 1 above show the result of the egg layed by birds fed with conventional feeds and CPH fortified feed. It means that there is very close difference between the two feeding ingredients. The result of [10] corroborates this finding that 100% maize substitution with CPH, had no significant effect on the survival, weight gain, and feed conversion ratio at reduced cost in the diet of *Oreochromis niloticus* .

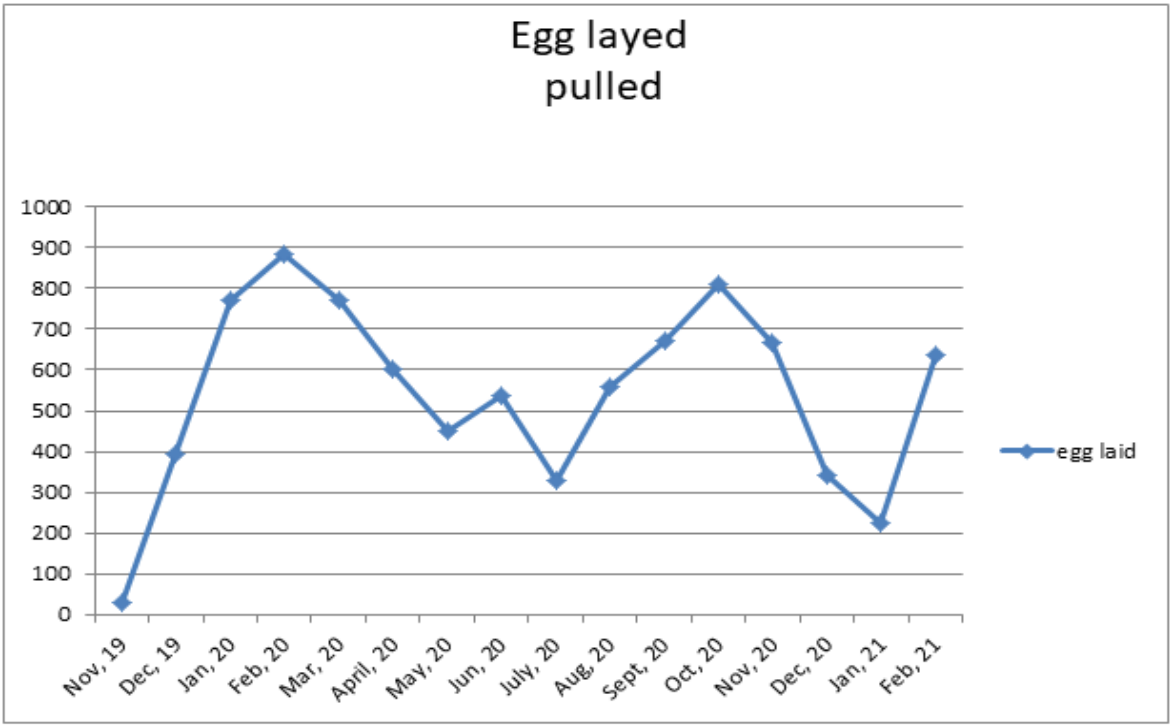

Figure 2: Egg layed pulled with both feeds ingredients.

Source: field survey, 2021

The figure 2 above shows the egg layed by birds fed with the conventional feed and CPH fortified feed between November, 2019 and February, 2021. It was observed in the figure 2 above that a sharp drop in the egg layed by birds in July 2020, this was due to the poor feeding and medication regime due to the fact that the principal of the school diverted money realized from the sale of eggs to other school projects, so birds were not fed properly and adequately. So CRIN came to the rescue by supplying feeds and multivitamins to the birds. So their was an improvement in egg laying capacity of birds after the intervention.

4. Constraints

- Transportation problems during Covid-19 pandemic national lockdown (March – October, 2020) it was very tasking and costly to get feed across to the school because of restriction in vehicular movement during the Covid- 19 pandemic.
- Theft of eggs and birds were experienced at different times in the poultry, especially during students long holidays when minimal supervision/ security was experienced.
- The cold attitude of the new school principal toward the poultry project apart from the financial benefit

he enjoys from sales of eggs.

- Diversion of money realized from sales of eggs from the poultry projects to other school project, thereby jettision the poultry immediate needs such as feeds and medications. In fact CRIN has to salvage the situation in some occasion by supplying feeds and drugs to make the poultry project sustainable.
- Irregularities in record keeping during students long holiday

5. Conclusion

- The poultry project is a very good way of disseminating CRIN technologies to adopted school.
- CPH can be used effectively to replace 20kg of maize and still achieve the same result as using the conventional feed.
- The students and teachers gained allot in the activities spanning from renovation, stocking laying and record keeping, which gives them an insight of how they can invest on poultry production after graduating from school and to the teacher after retirement.
- It increases the students interest in agriculture because seeing is believing and a participatory approach was used during the project.

6. Recommendations

- Monitoring and evaluation team should be empowered financially for the sustainability of the project.
- Back-up funds should be made available to bail out schools in case of emergency situation as experienced in Mamu in January, 2021.
- More adopted schools should be established to enjoy the good gesture from CRIN.
- Security of the poultry pen should be taking more seriously by the school management.
- Back-up plans should be on board to sell off and restock the pen when the birds are getting old and production has dropped.

7. Moments captured on camera

Figure 3: Renovated poultry pen at Mamu school.

Figure 4: Research scientists with Agric students in the renovated pen before stocking of birds.

Figure 5: Agric student feeding the birds.

Figure 6: Eggs layed before collection with CRIN Team and students on industrial attachment in the poultry.

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