

DESIGN AND DEVELOPMENT OF A DOMESTIC POUTRY PROCESSING EQUIPMENT.

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ABSTRACT

This abstract advocates the implementation of the modified defeathering machine with its accessories of the constriction cones and the scalding to replace the traditional method which is slow and tedious in dressing chickens. The proposition improves on the defeathering machine by the conversion of the washing machine whose two compartments are modified into a scalding and a defeatherer respectively, thus twining the scalding for softening the feathers and plucking into the same machine.

The study reviews literature on the originality of the riving machine by Andrew Toti and Kent Tomlinson in 1940's based on this information, the modified defeathering machine applies similar mechanism in the conversion of a washing machine into the desired modification and thus reverse engineering is applied. In addition, the study involved concise study of the computer aided drawing design (CAD) in the field of today's manufacturing industry in line with the need for innovation.

Apparently, it was observed that the traditional method was not only torturous but also inefficient process of dressing chickens. It is tedious and slow managing only one chicken at a time.

It was also noted that the original defeathering machine needed a separate scalding rendering movement from it to the defeathering device.

The modified defeathering machine is a definite improvement on the original and also significantly facilitates chicken processing supplanting the traditional methods efficiently and consequently multiplies chickens dressed at a time to cope with the ever-increasing demand for chicken consumption.

Key Words: *defeathering, facilities, improves traditional, demand, slow, plucking, efficient, tedious conversion.*

INTRODUCTION

Nowadays the world is rapidly transforming. Virtually every human activity from the traditional methods to technologically based operations for facilitation. And hence the modified defeathering machine is one of such inventions

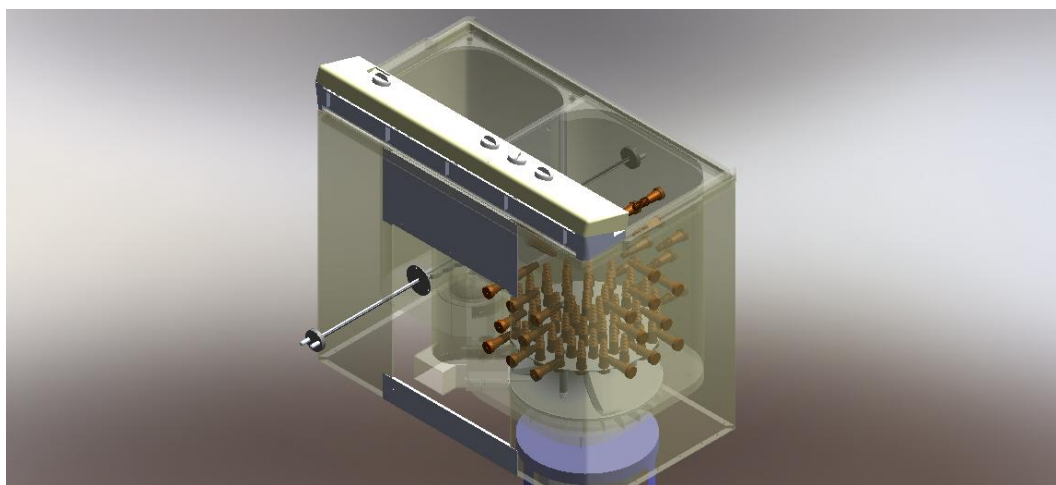
In recent times the invention of the defeathering machine is attributed to Andrew Toti however, this idea was adopted to adapt a derelict washing machine into a modified defeathering machine with efficacy. The modification incorporated the scalding and the defeatherer into one machine, this was a machine improved upon the original defeathering machine whose accessory mechanisms were separate.

BACKGROUND:

A chicken has been very important in the Zambian culture and diet always being treated as a special delicacy. If a guest is served with chicken in a meal, that means a great honour. Thus slaughtering a chicken or chickens in the past was on rare occasions. In rural areas everybody rears some chickens in Zambia. It is the most important type of relish for most people with hardly any exceptions.

The traditional preparation of a chicken is torturous to the bird as it involves chasing and capturing it. Then it is vigorously stopped on to restrict the legs and wings from moving before cutting off its head. Sometimes the wings are accidentally broken to add to the torture. Slaughtered, the chicken is soaked in hot water and depluming starts immediately but perfunctorily owing to the hotness of the water. Uncontrolled temperature of the hot water may result in peeling off the chickens' skin. Only one chicken at a time could be deplumed by an individual. The process is slow

MATERIALS



TEMPERATURE

- i) You need a thermometer of some sort to measure the temperature of your scald water.
- ii) Heat your scalding water up to between 100 degrees

MOTOR RECOMMENDATIONS

- i) Three quarter hp, 1725 rpm farm duty motor
- ii) Half hp farm duty motor work
- iii) 1 hp farm duty electric motor

GLOVES

- i) You need heat resistant gloves

HORSE

- i) Rubber or PVC horse is ideal

MATERIAL FOR CASING

- i) Plastic material reinforced with stainless steel

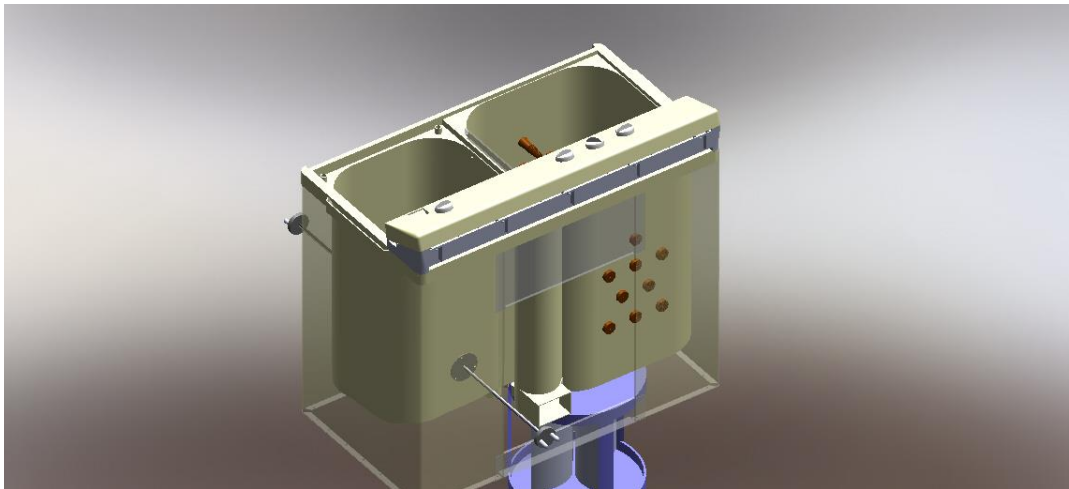


Fig 1

The plucker consists of a tub with a disc shaped motor driven plate in the bottom. The plate called the feather plate is studded with rubber plucker fingers turn the motor on, and the plate's spins.

Drop one or more scalded birds into the tube while spraying with the horse the critters tumble around while the fingers fail the feathers off. In about 15 seconds the chicken will be plucked clean.

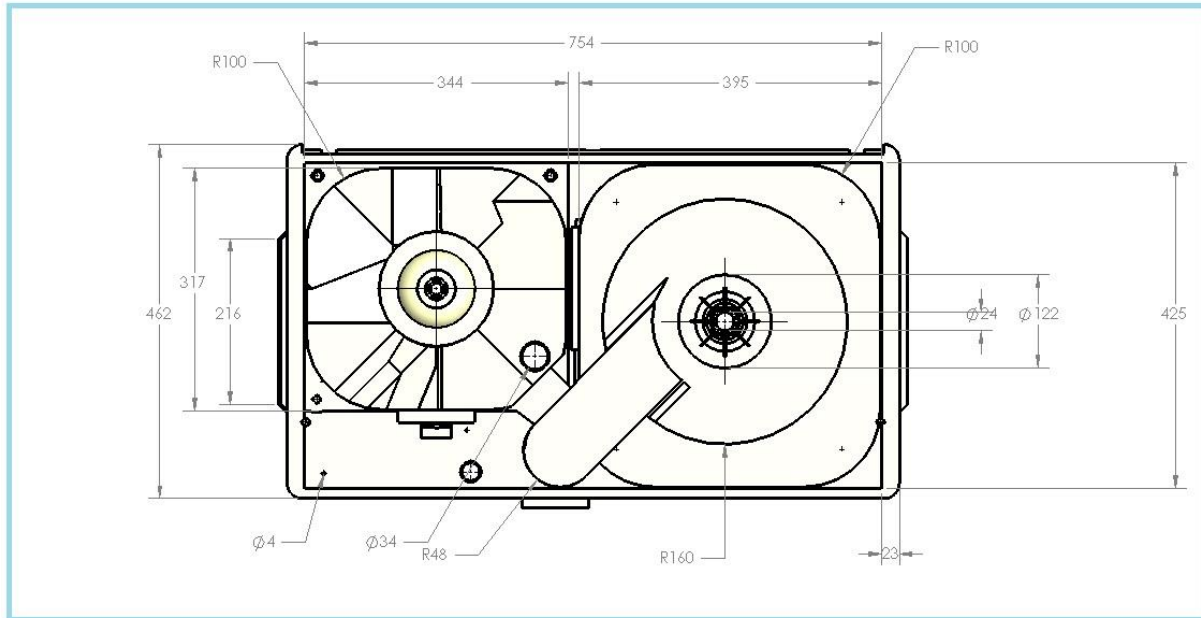


Fig 2

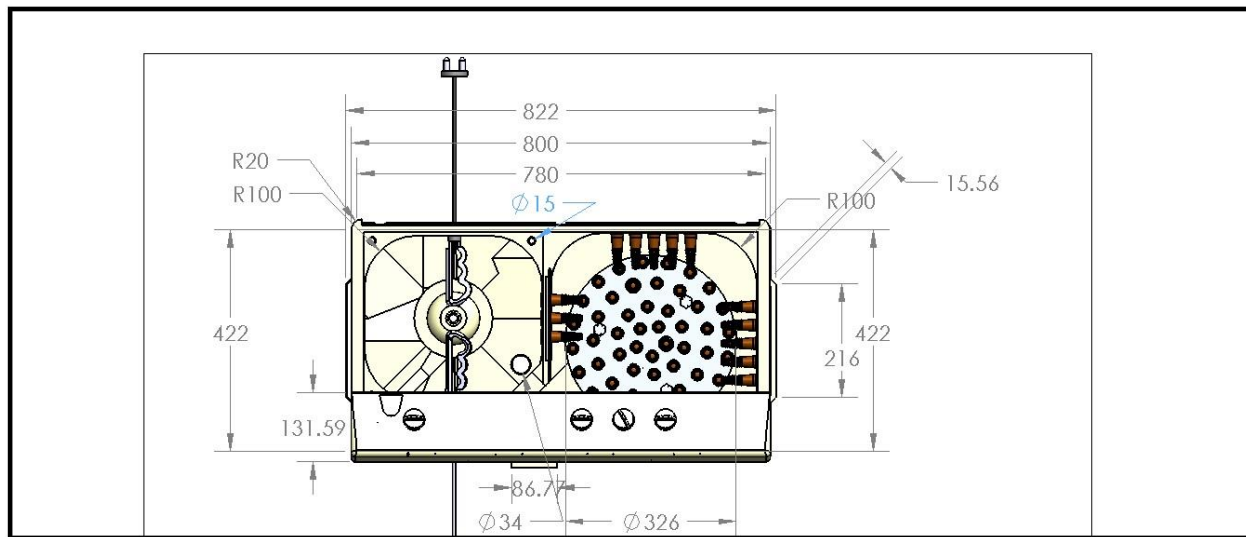


Fig 3

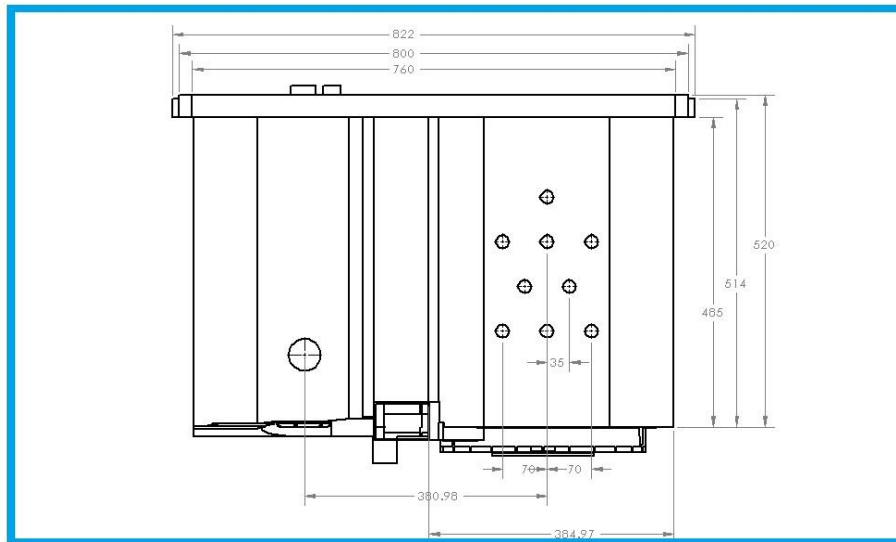


Fig 4

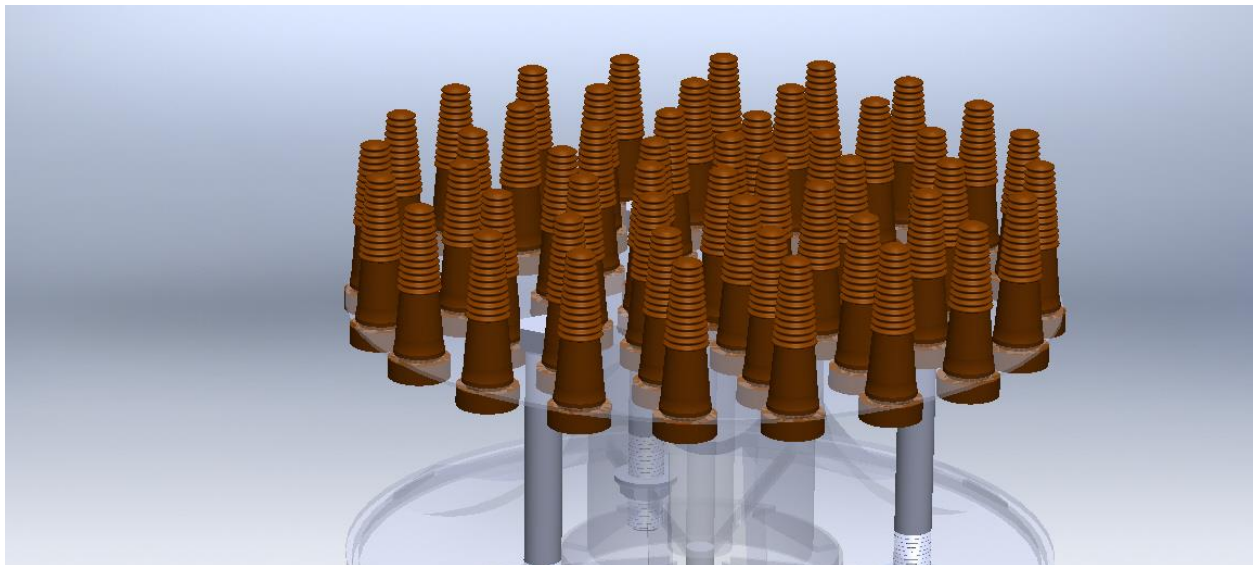


Fig 5

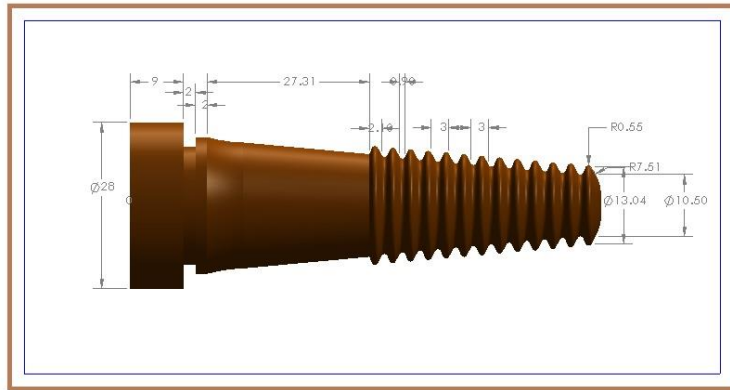


Fig 6

SPECIFICATIONS OF THE RUBBER PLUCKER FINGERS

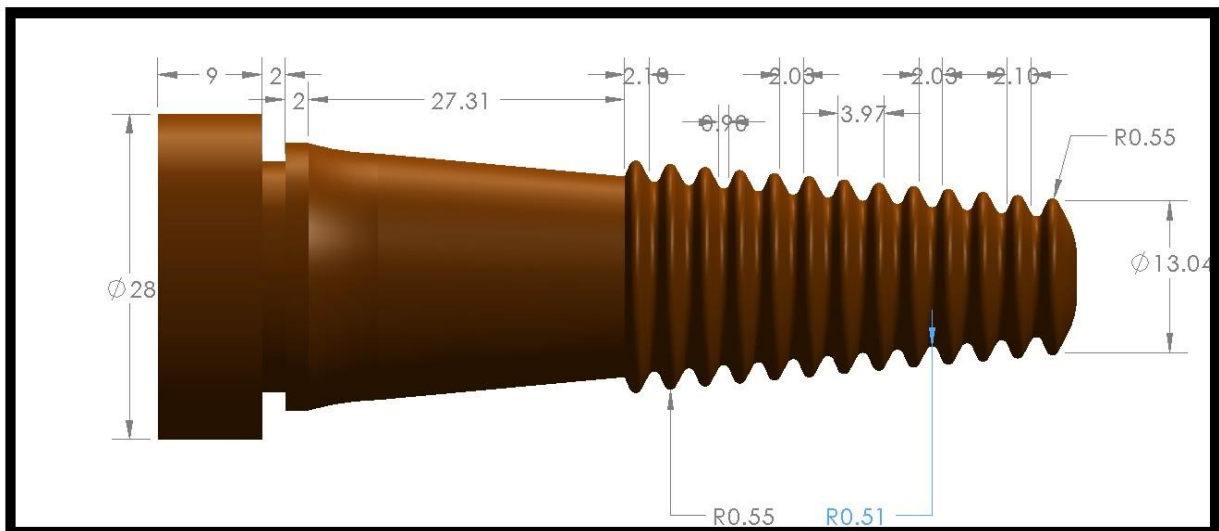


Fig 7

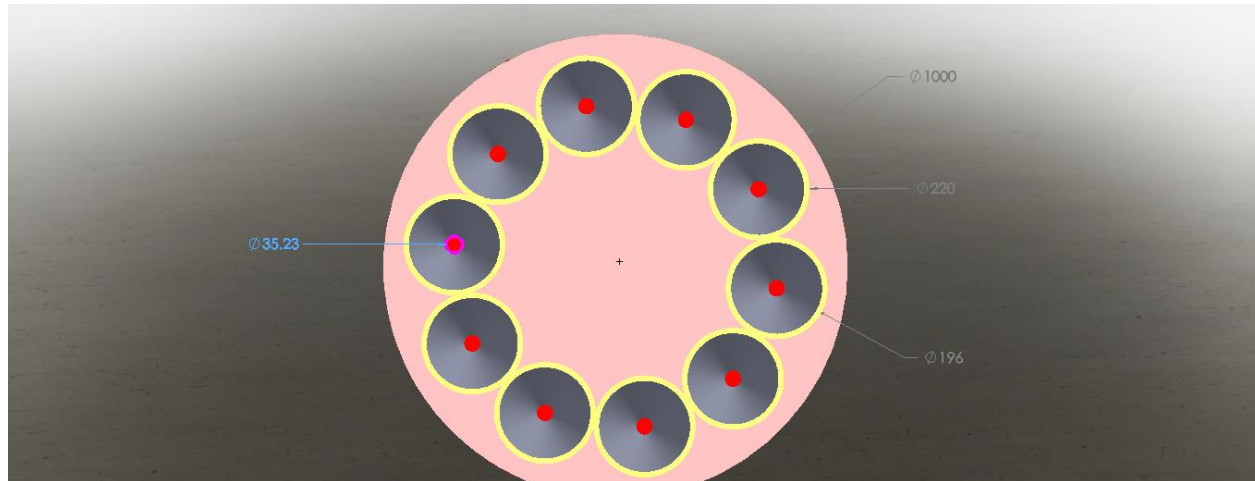
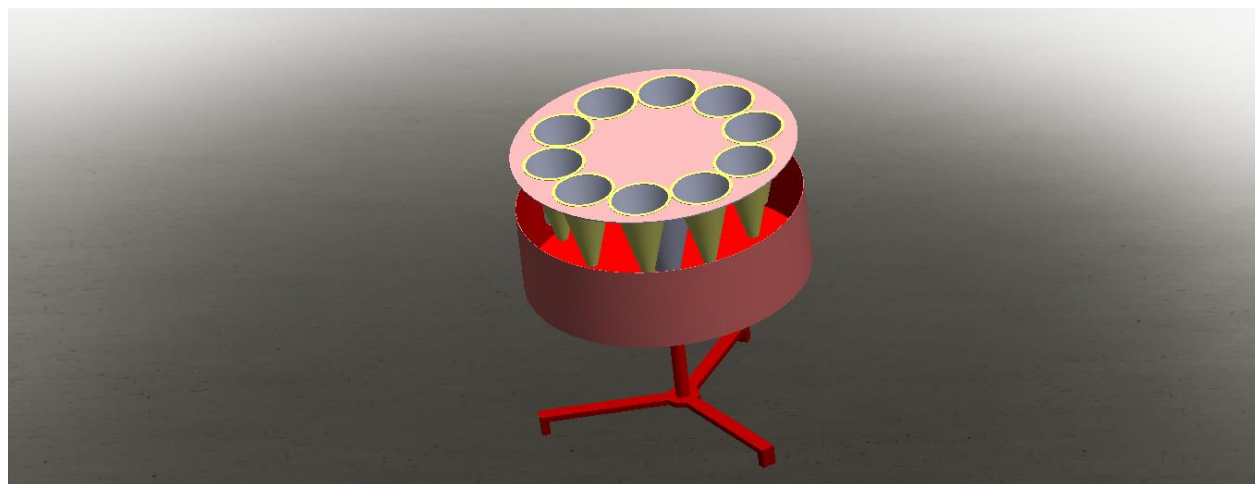


Fig 8

COSTRICTION CONES



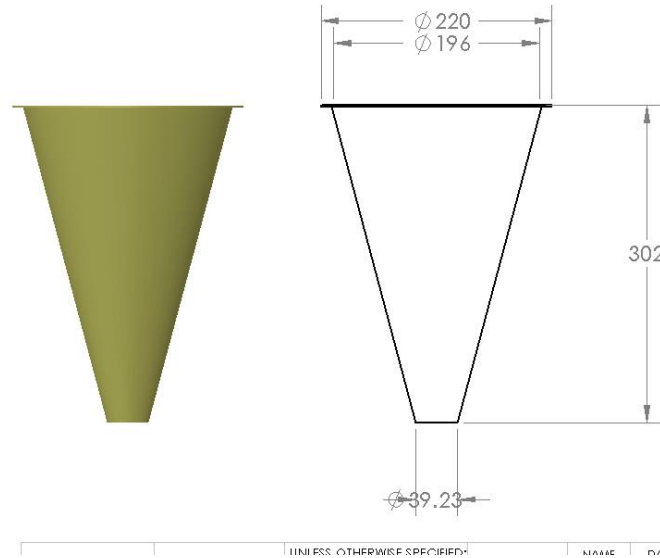


Fig 9

CHICKEN DEFEATHERING TECHNIQUES

There are several defeathering techniques traditional and modern. The traditional process is torturous capture of the chicken before decapitation with subsequent scalding in unspecified temperature of hot water where simultaneously plucking of feathers is one slowly, tediously and perfunctorily at the rate of the chicken per time.

The modern method involves slaughtering in constriction cones several chickens at a time if need be, softening of the feathers in a scalding tank and then feathers in a scalding tank and then mechanically depluming them in the defeathering machine.

The modified defeathering machine evidently facilitates the process from scalding to plucking by the flexible rubber rods.

PROBLEM STATEMENT AND PROBLEM ANALYSIS

PROBLEM STATEMENT

The traditional method of dressing a chicken is defeathering it is slow and inefficient. Consequently, the ever increasing demand for chickens renders the traditional methods too deficient to meet the required supply in Zambia.

PROBLEM ANALYSIS

Owing to the abolition of hunting by wildlife conservationists and large-scale urbanization, the demand on the consumption of chickens in Zambia is ever increasing exponentially. Thus there has been need to accelerate defeathering in the supply of chickens both to the urban and rural dwellers in Zambia.

The numerous abandoned washing machines now causing problematic environmental trash could be converted into defeathering machine is bound to serve a dual purpose namely: acceleration of defeathering and environmental removal of trash by conversion to usefulness.

OBSERVATION ANALYSIS AND INVETIVENESS

The study led to critical observation of the traditional method of slaughtering, scalding and defeathering. Moreover, the original defeathering machine was also similarly analyzed and some of its inefficiency noted in the rather distant or separate scalding, it was noticed that the mechanism of the defeathering machine was similar to that of the washing machines with many of them abandoned in hospitals and elsewhere lying as scrap and trash polluting the environment.

It was then decided to make a prototype of converting a washing machine into a modified defeathering machine combining the scalding and the defeatherer with the compartments being already extant in the washing machine. It was now a matter of introducing the rotary motion and the flexible rubber rods. The modification was efficacious.

RESULTS

Currently in Zambia there is need for the modified defeathering machine to cope with the ever-increasing demand for chicken consumption and replace the inhuman slaughter of chickens traditionally by using the construction cones. The following advantages will occur:

- (a) The modified defeathering machine is fast and efficient.
- (b) More than one chicken can be plucked at a time.
- (c) The defeathering machine as modified may even be used in rural areas where there is no electricity.
- (d) The rotary motion can be attained by an electric motion, pedaling, treading or turning a crank by hand.
- (e) Abandoned washing machines will be used as the raw materials for the defeathering machine.
- (f) The flexible rubber rods are available.
- (g) It is not a difficult task to find spare parts and assemble the modified defeathering machine.

DISCUSSIONS

It was noted that more and more restaurants as well as lodges not to mention a hotels and hostels were rapidly increasing all over the country especially in urban areas. There were also pleasure resorts in rural areas. Moreover, the tradition cultural diet had drastically changed whereas in the past serving of chicken was an exemption treat of honor to be served. Now is the general and common past of everyone's diet daily.

Rearing chickens had apparently become a widespread occupation especially broilers for sale. Butcheries had increased with more chickens than beef, pork, mutton or goat meat. But chicken dressing remained at a snail's pace and thus not able to meet the ever increasing demand for chickens.

Then there was need for modernization, innovation, adaptation for chicken supply to meet the consumer demand. Besides the updated defeathering method or technique, was not only for chickens but also other poultry such as guinea fowls, turkeys and ducks.

The marketability of the defeathering machine was equally looked into and there was a positive response from those interviewed. The estimated response was eighty percent (80%) that agreed to purchase the defeathering machine if available. They said it would be most convenient to process chickens with such a machine and remove the drudgery of depluming chickens by fingers.

Affordability of the defeathering machine was also discussed at length with the prospective customers.

They agreed that so long as it was not too expensive to buy they would be willing to acquire it. Tentatively all those approached accepted the offer.

This research was mainly confined on the copper belt but the advertisement of the defeathering machine would be eventually extended to the entire country. The restrictive factors included financial constraints to travel to all provinces.

So beyond the copper belt the interviews or proposals were by telephone. Other difficulty concerned was convincing people to change their traditional methods of processing chickens to adopt the new approach. The oddments were individuals who were only affected by domestic consumption and not on a large commercial scale of keeping poultry.

Strong opposition was also met from individuals who did not approve of slaughtering birds of any kind. They considered the act cruel irrespective of how such chickens were slaughtered and defeathered. Surprising among such opponents were consumers of chickens. Asked about this contradiction they argued that it was just because there was no other alternative food as delicious as chickens in Zambia. They expected somebody to slaughter the chickens which they could however eat. Another was sheer lack of a variety of relish in their localities.

Further research encountered questions regarding the manufacturing machines once the discarded washing machines ran out of availability. This was indeed a good question.

The designer of the modified defeathering machine did not mean to depend on the discarded washing mashies forever. In due course similar bodies would be developed. After all the most important part was the motor and flexible finger like rubbers. Metal fabricators could build

alternative washing machine bodies. To do so was not a complex issue as it would be mere simulation of the extant washing machine.

Considering the many superstitions that exist concerning what type of food was permissibly consumable, the research took into account certain religious beliefs to found out how the targeted market would be affected by the defeathering machine and its concomitant of slaughter method. It was not so much the problem of defeathering that affected the issue but the method of killing the chicken. Some people could not accept eating a chicken which was killed in the different way from that prescribed in their religions. These sectarian groups were rigid in their beliefs such that they would not contribute to the prospects of enlarging the defeathering machines market.

Another notable factor was the difficulty of introducing the defeathering machine in the typical rural areas which were devoid of electricity.

Boarding schools and other academic institutions which needed chickens in bulk were possible market targets as their administrators would appreciate such a facility and expressed satisfaction that it would simply be a matter of time and availability to acquire it.

Proprietors of restaurants and hotels understood easily particularly when they were found to have had received higher education.

Furthermore, unexpected encouragement came from tailors who needed large quantities of feather for stuffing pillows and cushions.

It would be a matter of drying the deplumed feathers in the sunshine. Thus the defeathering machine prospects of success were immense as it aroused interest in wide range of people in various occupations. Cooks and chicken consumers or dinners, hoteliers and restaurants operators, poulterers, and boarding masters, electrical and machine engineers plus metal fabricators and tailors were all interested. Even a restaurant owner in Lubumbashi expressed interest revealing an export prospect.

The research considered the establishment of a pilot plant factory for the manufacture of the defeathering machine in Luanshya industrial area. The care taker of the defunct Mpelembe drilling company's premises were approached for the purchase of the buildings there and in fact the entire plant which is on sale. The facilities at Mpelembe drilling company which was no longer functional were excellent for the enterprise. The location was ideal for advertisements and popularization of the project.

Since it was situated near metal fabricators institutes, the apprentices would be asked to participate in the pilot project for the manufacturing of the defeathering machines. Thitha engineering was also contacted and agreed to cooperate in order to assist whenever such expertise was needed.

The responses from banks and companies that valued the feasibility of the defeathering machines marketability and profitability were most favorable to finance the project.

The banks and general managers' were enthusiastic to support the enterprise financially. They assuredly promised that the financial risk was worthy.

While engineering experts were available, unskilled labor would be equally employable.

However, some renovations were essential to rehabilitate the plant completely as it had been partially vandalized by fake prospective offers to buy the plant and premises.

The company itself had auctioned the equipment in the machine shop though the building structures themselves were still in good conditions. The rehabilitation would not cost much. The warehouse was intact. There were many accessories that made the proposed defeathering machine factory self-contained.

Initially for demonstration purposes to convince prospective customers some chickens would be reared within the plant premises so that the workability of the defeathering machine would be fully are tested before sale.

The estimated cost of production was found to be able to supply the defeathering machine at an affordable price under Zambian conditions. It was however, decided to keep it a secret lest others would copy the idea before patenting the innovation. As soon as the pilot project would prove economically viable, the idea would be patented.

At first production would be based on orders from the customers and then the industry would grow and expand gradually.

Evidently the defeathering machine was concluded on a positive note.

CONCLUSION AND RECOMMENDATION

Conclusion.

The modified defeathering machine possesses evident advantages over traditional and conventional means of depluming chickens. Therefore its adoption will revolutionalise chicken processing further and economically.

Recommendation

This modified defeathering machine is highly recommended for implementation in Zambia countrywide with assured positive results.

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