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Formulation of Protein Rich Media and Broth Using Chicken Feather

P Devipriya[1], S Harshawarthini[2], Ms.M. Nivethitha[3]

[1,2]Student, Department of Microbiology, Dr. NGP Arts and Science College
[3]Assistant Professor, Department of Microbiology, Dr. NGP Arts and Science College

Abstract:
This study is about the formulation of protein rich media and broth from the chicken feathers that are collected near Tirupur district. This chicken feather are hydrolysed for the extraction of nutrition like protein,Peptone etc as it is considered as a waste it can be cost-effective. Livestock waste like blood and feathers and considered as valuable product as it has high protein content. Hence the primary aim of this study was to produce a cheaper nutrient alternative from chicken feather.

Introduction

The feathers are considered wastes although small amounts are often processed into valuable products such as feather meal and fertilisers. Chicken feathers have been employed in the production of animal feed, textile production and paper production amongst many others Chicken feathers contain more than 90% protein (keratin), 1% lipids and 8% water. Bird Feathers and chicken feathers are majorly composed of the beta keratin . Keratins are bonded by a number of these bonds which make them naturally insoluble. These bonds require that they be broken in other to obtain the chicken feathers in usable forms for microorganisms. By hydrolysis, The conversion of such large amounts of chicken feathers into hydrolyzed forms for the manufacture of microbial culture media can be used as a measure of solving this problem. The chicken feather keratin can then be incorporated into the production of microbial culture media. This study was therefore targeted at utilizing the keratin in the waste chicken feathers as a cheaper alternative to peptone and also a nitrogen source for microbial growth.

Materials and Methods

Sample collection

Chicken feathers is collected from the commercial store near Tirupur. Brown colour chicken feathers were collected.

Pretreatment of chicken feather

The feathers were washed with water and then washed with the laundry detergents and then disinfected using 5% hypochlorite solution and then sun dried for about 1 week.

Feather hydrolysis

Hydrolysis of feather is done by using 1M of NaOH is added to the feather. Then this NaOH mixture was stirred vigorously and kept to stand for 5 hours . After hydrolysis ,the mixture is filtered with a clean, dry muslin cloth. Then this feather is dried using hot air oven

Precipitation of feathers

Feather keratin was precipitated separately from the hydrolyzed feather solution ,using 1M solution of the acid hydrochloric acid (HCL).Then this precipitated feather is then dried in hot air oven.

Formulation of media

The media is formulated (Figure 2.1) for 100ml of distilled water by using

- Beef extract -0.3g
- Nacl -0.5g
- Precipitated feather -0.5g
- Agar agar -1.5g

Formulation of broth

The broth is formulated for 100ml of distilled water by using

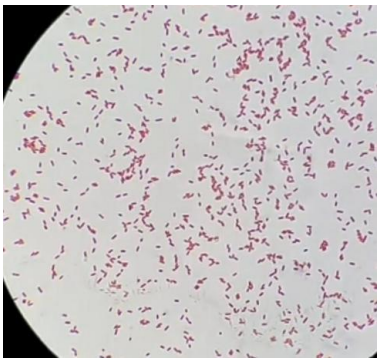
- NaCL -0.5g
- Beef extract -0.3g
- Precipitated feather -0.7g

Results

The result of the microbial growth in the formulated media and broth are given below

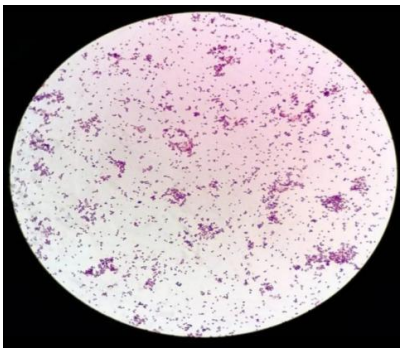
Microbial growth and microscopic examination

(*E.coli* growth in media)

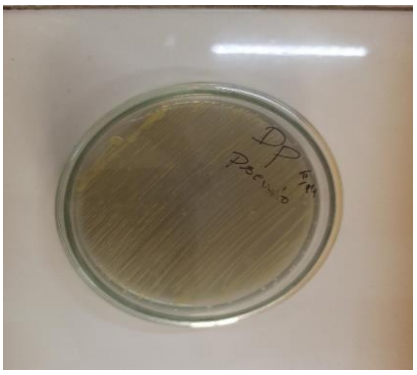


(*E.coli* microscopic view)

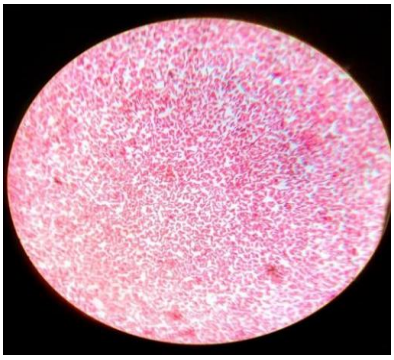
(*Staphylococcus sps.,* growth in media)



(*Staphylococcus sps.,* microscopic view)

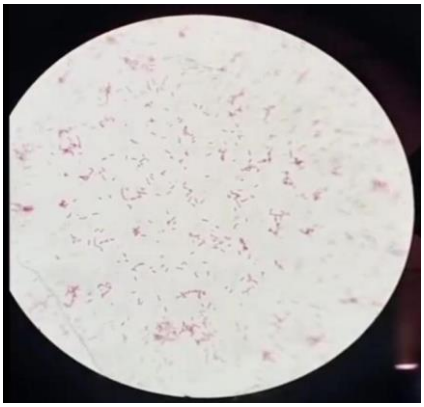


(*Pseudomonas sps.,* growth in media)

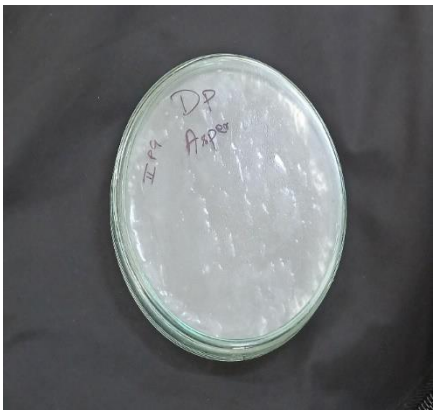


(Pseudomonas sps., microscopic view)

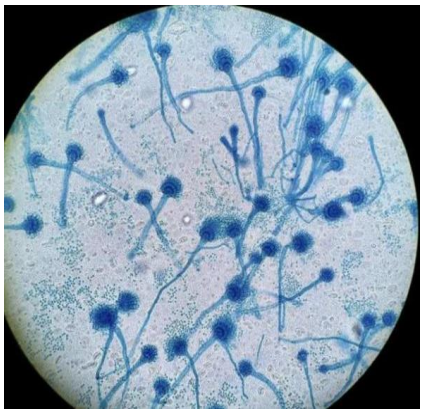
(*Klebsiella sps.,* growth in media)



(*Klebsiella sps*., microscopic view)



(*Aspergillus sp.,* growth)



(*Aspergillus sp,.* Microscopy)

Microbial growth in formulated media

The incubated plates were observed for the growth and the colony appearance. The formulated media in the first plate shows that smooth, circular, White to greyish white colonies. In the second plates the colonies are large golden yellow colonies. The third plate were observed as the small colonies with grey moist often mucoid (The fourth plate shows that has a large opaque, flat colonies)

Microscopic Examination of the media

The plates were observed under the microscope for microscopic examination. The first plate of the formulated media were observed as the gram negative that is pink colour, rod shaped were observed that

shows that it is *E.coli.* The second plates were observed as the purple colour, small round cocci with cluster formation were observed it as *Staphylococcus aureus* The third plate were observed as the pink colour, gram negative, rod shaped bacteria shows that it is *Pseudomonas*. The fourth plate shows pink colour, gram negative, rod shaped, non motile bacteria. Then the fifth plate shows that the colonies in blue green colour, branching hyphae on it observed it as *Aspergillus fumigatus*

Formulation of broth

The test tube containing formulated broth was observed as *E.coli*, *klebsiella*, *Staphylococcus*, and control

(*E.coli* growth in broth)

(*Klebsiella* growth in broth)

(*Staphylococcus* growth in broth)

(Control broth)

Discussion

The brown colour feather were selected for hydrolysis .The feather is treated with the three types of steps like washing with water, detergent and disinfected using 5% hypochlorite solution.These steps were done to remove the dirt and liquid components present in the sample. The feathers were then hydrolysis with the use of Sodium hydroxide.Then this feather is precipitated with Hydrochloric acid. Normally the media is formulated by using different compositions of Peptone but in this the alternative source is using that is

the hydrolysed feathers. The different compositions like Peptone , hydrolysed feather and blood agar were used but in this study the composition of formulated media was done using beef extract ,NaCL , precipitated feather and agar agar. Then this media is kept for sterilization and then this sterilized media is plated. Then the organism like *E.coli, Staphylococcus sp, Pseudomonas sp*. Then these organism were incubated and the growth is analysed by microscopic examination.

Conclusion

This study investigated the chicken feathers could be an alternative source of peptone source. The peptone source is the important source ,and plays an major role in the growth of microorganisms. Peptone growth media is commercially available but it is too expensive. Poultry industries has been producing lots of feathers which is considered as wastes, these wastes are dumped and cause environmental pollution. These feathers consists of many nutrients like keratin protein. This protein will help in major nutrition source like protein keratin and peptone. Three different types of pretreatment techniques were employed in the beginning of the experiment, these treatments were done to remove the dust and dirt present in the feather. The pretreatment techniques were done for the increase of hydrolysing yield, the pretreatment of feathers were done to remove the impurities and liquid components that are naturally present in feathers. The Feather is hydrolyzed with NaOH, then precipitation was done using acids. This precipitated feather are powdered and used as a media and broth. The media is plated and observed under the microscope.

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