**BIBLIOGRAPHY**

AMCAY, JENALYN B. November 2009. <u>Evaluation of Embutido Processed with dried "Rosemary" leaves</u>. Benguet State University, Trinidad Benguet.

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**ABSTRACT**

This study was conducted at the Meat Laboratory Section, Department of Animals Science, College of Agriculture, Benguet state University to determine the acceptability of embutiod processed dried rosemary leaves and the cost of producing the processed products.

A total of 25 panelists were invited to evaluate the processed embutido without dried rosemary leaves as well as that which was processed with different levels of dried rosemary leaves. The panels of tasters are composed of five persons from the students, teachers, housewives, food servers and dieticians. Three replications were conducted for each treatment and tasting sessions. The processed embutido were evaluated based on their appearance, aroma, tenderness, flavor and acceptability.

Statistical analysis revealed significant differences in terms of aroma, flavor and acceptability. It shows no significant differences in terms of appearance and tenderness. As for the aroma, embutido processed with 1 table spoon and 2 tablespoons of rosemary was rated with desirable and embutido processed without rosemary leaves was rated with moderately desirable by the panelist during the organoleptic rating. For the flavor, the panelist had a verbal description of very good in the embutido processed without and embutido processed with 1 tablespoon of rosemary leaves while for the embutido

Processed with 2 tablespoons of rosemary it was rated with good. For the acceptability, like moderately was the verbal description for the embutido processed without and embutido processed with 2 tablespoons of rosemary leaves and for the embutido processed with 1 tablespoon of rosemary leaves it was rated with like very much. For the appearance, embutido processed with 1 tablespoon of rosemary leaves was rated with very pleasing and embutido processed without and embutido processed with 2 tablespoons of rosemary leaves was rated with pleasing. As for the tenderness, all the three treatment were rated with very good.

As for the return on investment shows that embutido without rosemary had the highest return on investment with 13.31% followed by the embutido processed with 1 tablespoon of dried rosemary leaves with 9.34% and embutido processed with 2 tablespoon of dried rosemary leaves with 5.63%. The cost of production in embutido processed without embutido had the lowest cost with 317.7, embutido processed with 1 tablespoon of rosemary with 329.26 and embutido processed with 2 tablespoon of rosemary with 340.82 had the highest cost of production. The cost of production was more or less the same except from the level of rosemary added. The more rosemary added the higher the expenses.

## INTRODUCTION

Meat processing is a practice done by many people more than a thousand years ago. In the early age, the most common are salting, drying and smoking. While for today's generation, freezing and curing are also done wherein some preservatives are mixed in processed meat products. This is done to preserve meat for future use. The meat is treated to preserve freshness, frozen to keep it from being spoiled by bacteria, and shipped to consumer markets.

Many processed meat products in our days have almost the same ingredients but the only difference is in the taste of the products that are having different spices. Iron, zinc, selenium, copper and other essential nutrients are found in the meat especially in the lean portion. Meat is generally source of the water soluble B complex group but a poor source of vitamin C and vitamin A, D, E and K. pork contains higher levels of the B complex vitamins than beef and poultry. Meat is also a good source of iron and phosphorous. The higher amounts of nutrients contained in meat made it a vital part of the human diet.

Rosemary (*Rosmarinus officinalis*) is a woody, perennial herb with fragrant evergreen needle-like leaves. It is native to the Mediterranean region. It is a member of the mint family Lamiaceae, which also includes many other herbs. Forms range from upright to trailing; the upright forms can reach 1.5 m (4 ft 11 in) tall, rarely 2 m (6 ft 7 in).The leaves are evergreen, 2–4 cm (0.79–1.6 in) long and 2-5 mm broad, green above, and white below with dense short woolly hairs. The flowers are variable in color, being white, pink, purple, or blue. (Al-sereiti, 1999)

The botanical name Rosmarinus is derived form the old Latin for 'dew of the sea', a reference to its pale blue dew-like flowers and the fact that it is often grown near the sea. It is a symbol or remembrance and friendship, and is often carried by wedding couples as a sign of love and fidelity. Tradition says that rosemary will grow for thirty-three years, until it reaches the height of Christ when he was crucified, then it will die. Sprigs of rosemary were placed under pillows at night to ward off evil spirits and bad dreams. The wood was used to make lutes and other musical instruments.

Rosemary is one of the oldest herbs known to man. It is a member of the mint family. Cooks from earliest times have used it because it was believed that rosemary would increase memory. Rosemary also has many uses outside the kitchen. Brides have worn wreaths made of rosemary and Shakespeare immortalized rosemary in Hamlet as a symbol of remembrance and fidelity. Rosemary was often carried in the handles of walking sticks and sniffed while traveling and it was also burned in sick chambers to purify the air.

Rosemary is an extremely useful herb, with many culinary, medicinal and aromatherapy attributes. Rosemary stimulates the central nervous system and circulation making it beneficial for low blood pressure and sluggishness. The essential oil can be diluted for topical use to alleviate the pain of sprains, arthritis, sciatica and neuralgia.

In meat processing we can used this herb to fight against some sickness and illness. We can also use this for prevention of diseases, in other countries they are using this herb for medicinal purpose and not just for main traditional way.

This study was conducted to encourage people to utilize people rosemary because of its higher nutritional value, better taste and perhaps alters consumption patterns away from less healthy choices. It also provides the basic information to food processors and persons who engage in meat processing especially in embutido making.

The objectives of this study is to determine the acceptability of embutido processed with rosemary, to determine the production cost and profitability of processed embutido with rosemary and to determine the shelf life of the product.

This study was conducted at the Meat processing laboratory, Department of Animal Science, College of Agriculture, Benguet State University, La Trinidad Benguet from April to May 2009.
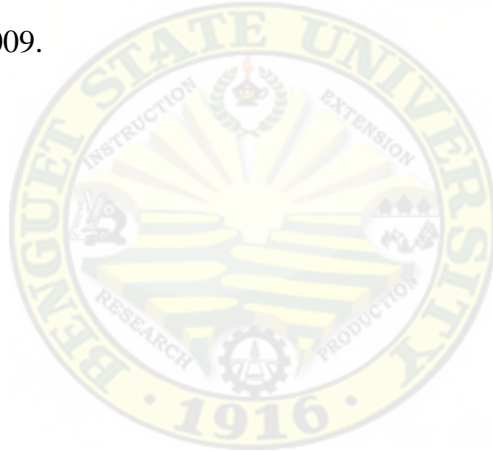
## REVIEW OF LITERATURE

Mumtaz (2007) stated that right from the prehistoric ages, man has adopted various techniques for the preservation of food. Techniques used for the preservation of foods attempt to protect food from getting spoiled due to yeast, mould, bacteria, contact with rodents, cockroaches or lizard. But it was also stated that there is no doubt that fresh food is always better than the preserved food. But it would not be possible as well as practice to have always fresh.

Keville (2007) said that there are three major chemotypes of Rosemary available on the market today and each one has a different chemical breakdown. *Rosmarinus officinalis ct. cineole* is the rosemary most commonly available it contains around 30% oxides (1, 8-cineole), 30% monoterpenes (pinene, camphene, myrcene, limonene, cymene), 25% ketones (campher, carvone, thujone, octanone), as well as some alcohols, esters and sesquiterpenes. *Rosmarinus officinalis ct. camphor* contains much higher percentage camphor and a lower percentage cineole. *Rosmarinus officinalis ct. verbenone* main chemical constituents are bornyl acetate (esters), alpha-pinene 15-34%, beta-pinene, camphene, myrcene, limonene, alpha-terpinene, terpanolene (monoterpens), borneol from a trace to 7% (alcohol), verbenone 15 — 37%, camphor 1 — 19% (ketones), 1,8-cineole from a trace — 20% (oxide). Rosemary is a good source of the minerals iron and calcium, as well as dietary fiber. Fresh has 25% more manganese (which is somehow lost in the process of drying) and a 40% less calcium and iron, probably due to the higher water content**.** Principal constituents of rosemary are borneol, camphene, camphors, cineol, verbenone, pinenes, limonene, linalol, terpineol. The volatile oils contents of rosemary are cineole and borneol, camphor, flavonoids, rosmarinic, acid, slicylates.

Burkhard (1999) stated that rosemary in culinary or therapeutic doses is generally safe; however, precaution is necessary for those displaying allergic reaction or prone to epileptic seizures. Rosemary essential oil may have epileptogenic properties, as a handful of case reports over the past century have linked its use with seizures in otherwise healthy adults or children. Rosemary essential oil is potentially toxic if ingested. Large quantities of rosemary leaves can cause adverse reactions, such as coma, spasm, vomiting, and pulmonary edema (fluid in the lungs) that can be fatal. Avoid consuming large quantities of rosemary if pregnant or breastfeeding.

Brown (1995) stated that rosemary has many uses besides culinary. It is used as a medicinal, an aromatic, an ornamental in the landscape, as a dye, in cosmetics, and as a houseplant. Rosemary essential oil adds a piney scent to soaps, creams, lotions, perfumes, and toilet water. It is a stimulating herb and makes a wonderful herbal bath when you feel worn out and want to get your blood flowing under your skin again. Just put some in a muslin bag and get in the tub with it. You can also treat yourself to a cleansing and pick-me-up facial steam with a strong infusion. Blend it in potpourri. It can be woven into wreaths and garlands. Rosemary sachets are very nice for scenting drawers. Dry needles can be added to other herbs and made into closet sachets to repel moths. These smell a lot better than mothballs and are not toxic. It yields a green dye. Medicinally, a warm tea is good for colds, flu, rheumatic pain, indigestion, and as a stimulating drink for headache and fatigue. It is antiseptic and promotes sweating and the flow of bile. It acts as an antidepressant, a circulatory stimulant, and a tonic for the nervous system and the heart. It is a rich source of vitamin A and vitamin C, Phosphorous, iron, magnesium, and zinc.

It also has antioxidant properties. A strong infusion makes an antiseptic mouthwash and gargle. The essential oil can be used externally as an ingredient in salves for arthritis and to soothe aching muscles. Extracts are found in shampoos. A hair rinse of a strong infusion can help dandruff and is good for dark hair. Do not use the pure oil internally. Like all medicinal plants, be cautious when using as a healing herb. The essential oil should not be used internally and when used externally, it should be diluted as is true for all essential oils except lavender. It should not be used in pregnancy, as it is a uterine stimulant. Large doses are irritating to the kidneys and stomach, but used in lesser amounts as a seasoning, it is perfectly safe.

Falsetto (2009) stated that rosemary is an extremely useful herb, with many culinary, medicinal and aromatherapy attributes. Rosemary stimulates the central nervous system and circulation making it beneficial for low blood pressure and sluggishness. The essential oil can be diluted for topical use to alleviate the pain of sprains, arthritis, sciatica and neuralgia.

According to Herbst (2001) said that rosemary leaves have a bitter, astringent taste, which complements a wide variety of foods. The herb can be obtained in whole-leaf form, fresh or dried, as well as in powdered form. A tisane can also be made from them. When burned they give off a distinct mustard smell, as well as a smell similar to that of burning which can be used to flavor foods while barbecuing. Among dishes where rosemary is used as a seasoning are soups, vegetables, meats such as lamb, fish and egg dishes, stuffing and dressings, and fruit salads. Rosemary is extremely high in iron, calcium, and Vitamin B6.

Culinary use. Bosworth (2001) stated that rosemary are numerous including using its flowers in salads. This herb is a wonderful compliment to meat dishes, especially lamb and pork. It can also be used to flavor baked potatoes, bread and in herb butter for vegetables. The stems can be used as skewers after removing the leaves. Dried sprigs of rosemary can be tossed on barbecue coals or into wood fires for aromatic grilling. Rosemary being a fragrant herb can efficiently enhance the flavor of any food, be it savory or sweet to which it is added. In general, rosemary can be used in a wide variety of culinary preparations, like for example, to season lamb, rabbit, veal, pork, sausages, as well as poultry, egg dishes, fish, pickles and shellfish, rosemary is also added to jellies, fruit jams, and cookies. Salads and vegetable dishes that need asparagus, cauliflower, broccoli, eggplants, green beans and peas, zucchini and potatoes, can use rosemary for that extra special flavor. Herb breads and biscuits can derive the benefit of the flavor that rosemary will bring to the dish being prepared. However, one must remember that the flavor can be quite strong, and therefore, the herb must be used only sparingly. They have a bitter, astringent taste, which complements a wide variety of foods.

Medicinal uses. Falsetto (2009) stated that rosemary is distilled into a valuable essential oil from the steam distillation of the flowers; Rosemary has healing properties of being pain relieving, restorative, stimulating, and anti-bacterial, decongestant, diuretic and anti-fungal. Rosemary is used in the treatment of muscular pain, rheumatism, circulation problems, mental fatigue, nervous exhaustion, cellulite, arthritis, colds, bronchitis, fluid retention, and sinusitis is suitable for dry, mature skin and acne.

Rosemary tea can remove headache, colic, colds and nervous disease and may also lift nervous depression. Rosemary is said to stimulate the memory and may be useful in restoring memory loss. Rosemary is also reputed to increase hair growth by stimulating the oily secretions of the hair follicles. It is mainly applied externally as a hair lotion which is said to prevent baldness and the formation of dandruff. The oil is used externally as a rubefacient and is added to loniments for fragrance and stimulant properties. Rosemary consumption improves digestion, fights against obesity, liver diseases, gastritis, cholesterolemia, bronchic asthma, edemas, and adjusts fast heart beats caused especially by irritability, coffee or tobacco excess. Because of its antiseptic and tonic properties, rosemary is extremely beneficial in cases of fainting, influenza, hangovers, asthma, bronchitis, cramps, constipation, cystitis, headaches, polypus, colds, cough, sinusitis or muscular pains. The plant also has a good influence on the blood circulation and blood pressure. As a natural fortifier, rosemary is extremely efficient during convalescence because it increases energy and optimism, also being recommended in cases of asthenia. For long term periods it fortifies and revitalizes the body.

Culpeper (2004) said that it has been used as a circulatory stimulant (treatment of blood pressure problems), antibacterial and antifungal oil, digestive stimulant, liver tonic, reduction of excessive menstrual flow, and is said to have cancer-inhibiting effects.

Moss (2003) he said that when the smell of rosemary was pumped into cubicles where people were working, those people showed improved memory, though with slower recall.

BIMR (2007) said that rosemary contains a number of potentially biologically active compounds, including antioxidants such as carnosic acid and rosmarinic acid. Other bioactive compounds include caffeic acid, ursolic acid, betulinic acid, rosmaridiphenol, and rosmanol. The results of a study suggest that carnosic acid, found in rosemary, may shield the brain from free radicals, lowering the risk of strokes and neurodegenerative diseases like Alzheimer's and Lou Gehrig's.

<u>Aromatherapy and Essential Oils Use</u>

Falsetto (2009) stated that the essential rosemary oil is a main ingredient in the industry of cosmetic products because of its analgesic, aromatizing, anti-inflammatory, peripheral blood circulation stimulating, antimicrobial and hair fall preventing action. Adding a few drops in a votive light or in the bath water, the essential rosemary oil is adequate for states of anxiety, headaches, debility, and weakness. It acts through unblocking the interior energies and in aromatherapy it is believed to help improve relationships with others. This essential oil helps to clear the mind, sharpen the memory and boost the central nervous system. In the body it helps to clear respiratory congestion, including sinuses and relieving catarrh and asthma. Its analgesic properties are useful for treating rheumatism, arthritis and sore stiff muscles. Furthermore, it stimulates the liver and gall bladder and helps to lower high blood sugar. On the skin, it has a tightening effect and reduces bloating and puffiness. In hair care, it stimulates hair growth and fights scalp problems. It has analgesic, antidepressant, astringent, carminative, cephalic, cholagogue, cordial, digestive, diuretic, emmenagogue, hepatic, hypertensive, nervine, rubefacient, stimulant, sudorific and tonic properties.

Embar (2000) stated that the nutrient content of 1 serving or 2 tablespoon (3.4g) of fresh rosemary and 1 serving or 1 tablespoon (1.2 g) of dried rosemary is as Follows:  ( www. Veganpeace.Com) (2005)

| Macronutrients | Fresh Rosemary | Dried Rosemary |
|---|---|---|
| Serving Size | 2 tbsp (3.4g) | 1 tsp (1.2g) |
| Calories (kcal) | 4 | 4 |
| Protein (g) | 0.11 | 0.06 |
| Total Fat (g) | 0.20 | 0.18 |
| Total Carbohydrates (g) | 0.70 | 0.77 |
| Dietary Fiber (g) | 0.5 (2%) | 0.5 (2%) |
| Vitamins | | |
| Vitamin C (mg) | 0.7 (1%) | 0.7 (1%) |
| Thiamin (mg) | 0.001 | 0.006 |
| Riboflavin (mg) | 0.005 | 0.005 |
| Niacin (mg) | 0.031 | 0.012 |
| Pantothenic Acid (mg) | 0.027 | - |
| Vitamin B6 (mg) | 0.011 (1%) | 0.021 (1%) |
| Folate (mcg) | 4 (1%) | 4 (1%) |
| Vitamin A (IU) | 99 (2%) | 38 (1%) |
| Minerals | | |
| Calcium (mg) | 11 (1%) | 15 (2%) |
| Iron (mg) | 0.23 (1%) | 0.35 (2%) |
| Magnesium (mg) | 3 (1%) | 3 (1%) |
| Phosphorus (mg) | 2 | 1 |
| Potassium (mg) | 23 (1%) | 11 |
| Sodium (mg) | 1 | 1 |
| Zinc (mg) | 0.03 | 0.04 |
| Copper (mg) | 0.010 (1%) | 0.007 |
| Manganese (mg) | 0.033 (2%) | 0.022 (1%) |
| Selenium (mcg) | - | 0.1 |
| Fatty Acids | | |
| Saturated Fat (g) | 0.096 | 0.088 |
| Monounsaturated Fat (g) | 0.039 | 0.036 |
| Polyunsaturated Fat (g) | 0.031 | 0.028 |

**MATERIALS AND METHODS**

In the study, six kilos ground pork was used. Four and one fifth lean and one and one fifth fat. The other seasoning ingredients and spices used in the preparation are the following: refined salt, ground black pepper, chopped onions and garlic, soy, sugar, cornstarch, raisins, condensed milk, green peas, hotdog, eggs, cheese, bread, carrots, and dried rosemary. The materials includes the following: weighing scale, cooking stove, refrigerator, steamer, mixing bowl, measuring spoons and cups, chopping board, knives, pan, and spatula.

Experimental treatment. There were three treatments in the study and each treatment was replicated three times.

The treatments used are as follows:

$T_0$= embutido without rosemary (Standard)

$T_1$= embutido with rosemary (1 tablespoon), (Figure 3)

$T_2$= embutido with rosemary (2 tablespoon), Figure 4)

All of the three treatments used the same ingredients of the same levels. The only difference was the level of dried rosemary leaves that was added. In the treatment 0 or the standard, no dried rosemary leaves was added, treatment 1 was added with 1 tablespoon of dried rosemary leaves and the treatment 2 was added with 2 tablespoons of dried rosemary leaves. Figures 1 shows fresh and dried rosemary leaves while figure 2 shows 1 tablespoon and 2 tablespoons of dried rosemary leaves.

Figure 1. Fresh and dried rosemary leaves



Figure 2. 1 tablespoon and t tablespoons of dried rosemary leaves

The ingredients used were as follows:

1 tablespoon refined salt

2 tablespoon finely chopped carrot

2-4 tablespoon corn starch

3 tablespoon ground black pepper

3 tablespoon of soy

2 tablespoon raisins

1 tablespoon of sugar

1 ¼ tablespoon chopped onions

1 ¼ tablespoon chopped garlic

2 tablespoon milk condensed milk

5 piece fresh egg

¼ cup cheese

5-8 pcs of loaf bread

½ kilo of hotdog

1 cup of green peas

The said ingredients ware mixed thoroughly. The resulting mixtures of each treatment are shown in (Figure 5, Figure 6 and Figure 7).
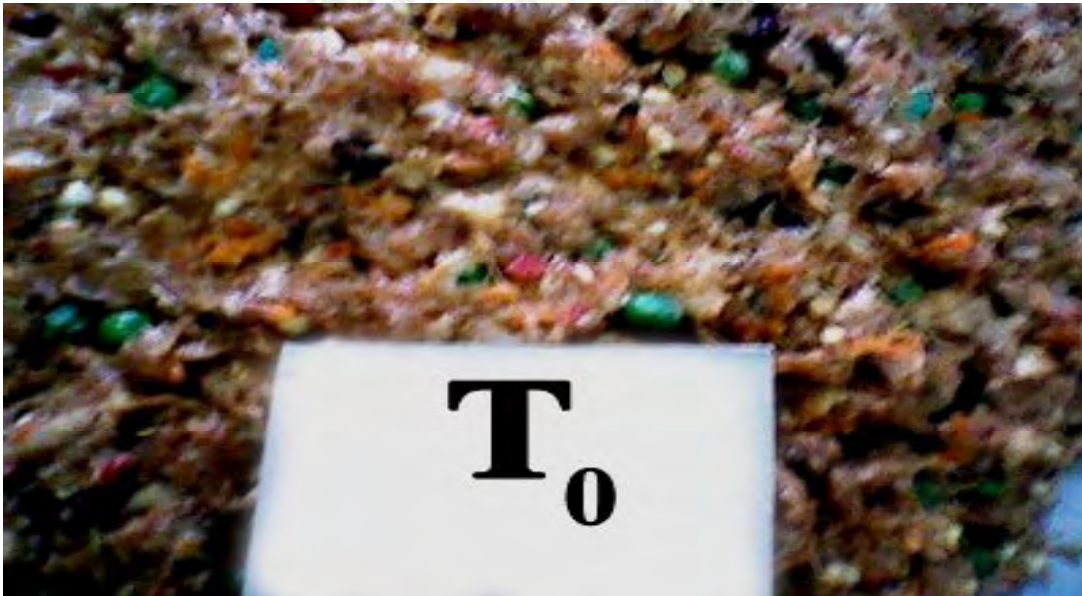


Figure 5. Mixture of all ingredients without rosemary

Figure 6. Mixture with 1 tablespoon of rosemary
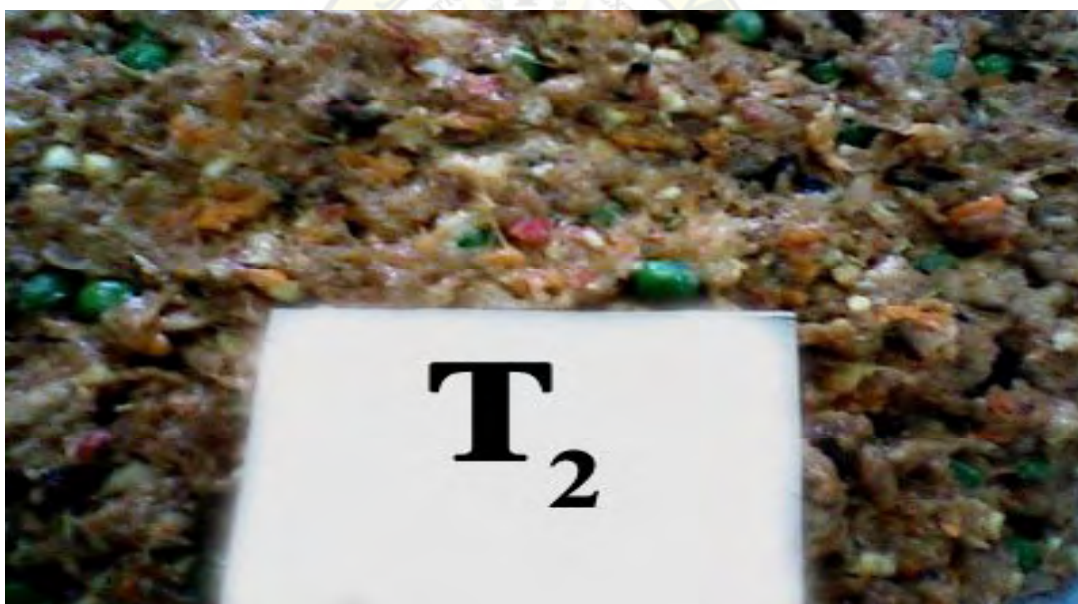


Figure 7. Mixture with 2 tablespoon of rosemary

Embutido making. In a large bowl, mixed the meat, pickles, chopped onions, raisins, peas, chopped carrot, potato starch, sugar, milk powder are combined until tacky. Salt and pepper were added to taste. After seasoning, fresh beaten eggs were added and mix thoroughly. Slice hard-cooked egg and cheese on top of mixture. This was then molded using a cylindrical molder about 4 inches in diameter, wrapped in foil then steamed for an hour. The steamed product was allowed to cool, unwrapped and then deep fried until golden brown before being sliced and was served to the taste panel.



Figure 8. Processed embutido without dried rosemary leaves after steaming.

Figure 9. Processed embutido with 1tablespoon of dried rosemary leaves after steaming



Figure 10. Processed embutido with 2 tablespoons of dried rosemary after steaming.

Organoleptic test. The cooked samples were brought to the panelist for taste evaluation and acceptability test on different days. Each panelist drinks after tasting the first sample that was presented to wash away the taste of any previous samples. The panelists were composed of 5 housewives, 5 teachers, 5 dieticians, 5 students and 5 food servers. The members of the panelist were given a score card to write down their respective ratings for each product. Organoleptic test was done three times to compose three replicates per treatment.



Figure 11. Processed embutido without dried rosemary after deep frying

Figure 12. Processed embutido with 1 tablespoon of dried rosemary after deep frying.



Figure 13. Processed embutido with 2 tablespoons of dried rosemary after deep frying.

Shelf life evaluation. The study revealed that under room temperature, the processed products are still in their consumable state. There were no sign of spoilage and molds. On the fourth day (June 1, 2009), all the treatments were no longer in their consumable state. Treatment 0 and treatment 1 had white and black spots on the surface while in treatment 2 white spots are present in the surface. Day fifth (June 2, 2009) all the three treatments were already started to smell rancid and the number of black and white spots increases. There is also a presence of gray spots. Day sixth (June 3, 2009) treatment 0, treatment 1, and treatment 2 had a strong smell of rancidity. Day seventh (June 4, 2009) all the treatment had molds over the product and presence of ooze that causes the watery appearance of the product. Embutido from the refrigerator reach until 28 days to rancid with pale white in appearance. Rosemary doesn't help in the preservation of embutido because the contents of rosemary are just for aroma and the flavor of the product. Figures 14 to 26 are a documentation of the changes that happened to the product during the shelf life evaluation.

Figure 14. Embutido without Rosemary at day 5 (June 02, 2009)



Figure 15. Embutido with 1 tablespoon Rosemary at day 5 (June 02, 2009)

Figure 16. Embutido with 2 tablespoons Rosemary at day 5 (June 02, 2009)



Figure 17. Embutido with out Rosemary at day 6 (June 03, 2009)

Figure 18. Embutido with 1 tablespoon Rosemary at day 6 (June 03, 2009)



Figure 20. Embutido with 2 tablespoons Rosemary at day 6 (June 03, 2009)

Figure 21. Embutido with out Rosemary at day 8 (June 05, 2009)



Figure 22. Embutido with 1 tablespoon Rosemary at day 8 (June 05, 2009)

Figure 23. Embutido with 2 tablespoon Rosemary at day 8 (June 05, 2009)
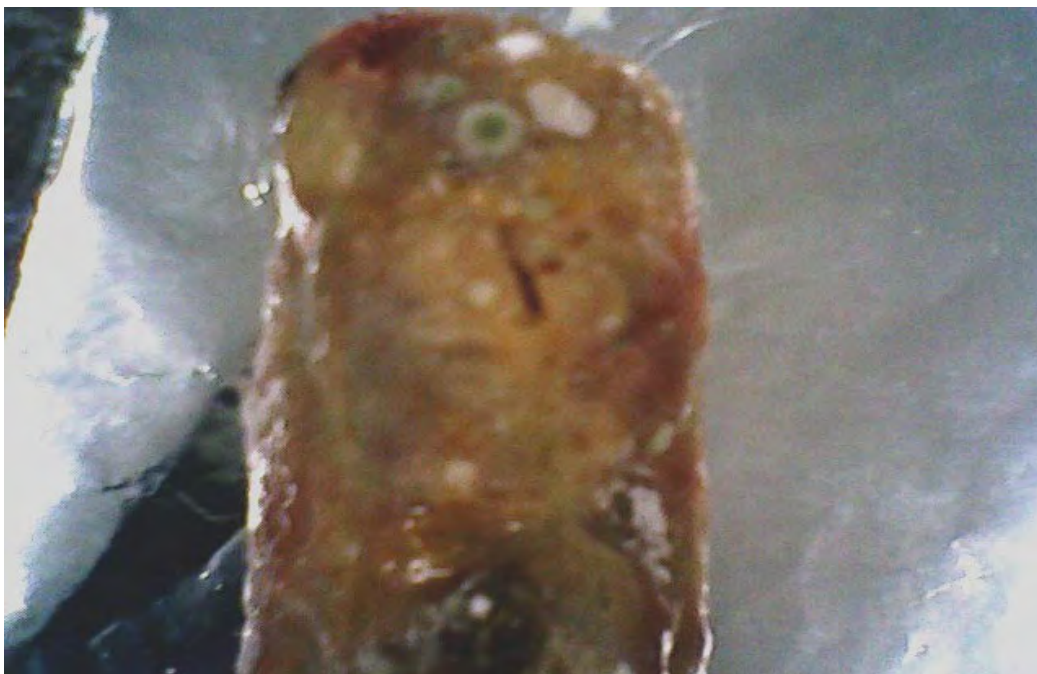


Figure 24. Embutido without Rosemary at day 9 (June 06, 2009)

Figure 25. Embutido with 1 tablespoon Rosemary at day 9 (June 06, 2009)



Figure 26. Embutido with 2 tablespoon Rosemary at day 9 (June 06, 2009)

The data gathered were the following:

1. <u>Appearance of the product.</u> This was evaluated using the scale below:

| Score | Remarks |
|-------|---------|
| 1 | Very pleasing |
| 2 | Pleasing |
| 3 | Slightly dull |
| 4 | Dull |
| 5 | Very dull |

2. <u>Aroma of the product.</u> This was evaluated using the scale below:

| Score | Remarks |
|-------|---------|
| 1 | Desirable |
| 2 | Moderately desirable |
| 3 | Slightly desirable |
| 4 | Slightly undesirable |
| 5 | Undesirable |

3. <u>Tenderness of the product.</u> This was evaluated using the scale below:

| Score | Remarks |
|-------|---------|
| 1 | Very good |
| 2 | Good |
| 3 | Slightly tender |
| 4 | Slightly tough |
| 5 | Very tough |

4. <u>Flavor of the product.</u> This was evaluated using the scale below:

| Score | Remarks |
|-------|---------|
| 1 | Very good |
| 2 | Good |
| 3 | Fair |
| 4 | Poor |
| 5 | Very poor |

5. <u>Acceptability of the product.</u> This was evaluated using the scale below:

| Score | Remarks |
|-------|---------|
| 1 | Like very much |
| 2 | Like moderately |
| 3 | Dislike |
| 4 | Moderately dislike |
| 5 | Dislike very much |

<u>Data  computed</u>

1. <u>Total cost of production (TCP).</u> This was computed by getting the total direct cost, which was done by adding the total cost of the meat and all the ingredients.

2. <u>Net income (NI)</u>. This was obtained by subtracting the TCP from the sales of the processed products.

3. <u>Return on investment (ROI)</u>. This was obtained by dividing the TCP by NI and multiplied by 100.

<u>Data Analysis</u>

Analysis of variance and Duncan's Multiple Range Test (DMRT) was used to determine the differences between treatment means. The date rendered by the panelist were recorded, tabulated and analyzed for any significance using this test. The samples were compared using verbal rating shown in Appendix Table 7.

**RESULTS AND DISCUSSIONS**

<u>APPEARANCE</u>

Table 1 shows the appearance of the processed embutido with different levels of rosemary leaves. Result show that embutido processed with 1 table spoon of rosemary was rated with very pleasing. Embutido processed without rosemary leaves and embutido processed with 2 tablespoon rosemary were rated with pleasing. Comparing the three treatments, embutido processed with 1 tablespoon of rosemary leaves had the very pleasing appearance compare to the other treatments.

Statistical analysis shows no significant differences among treatments. There is a difference in numerical and verbal description but it is not enough to cause a significant deviation. It also sows that addition of rosemary leaves do not cause any appearance to the embutido.

Table 1. Appearance of embutido

| TREATMENT | NUMERICAL MEAN | VERBAL RATING |
|---|---|---|
| $T_O$= embutido without rosemary | 1.5333[a] | Pleasing |
| $T_1$= embutido with 1 tbsp rosemary | 1.3867[a] | very pleasing |
| $T_2$= embutido with 2 tbsp rosemary | 1.6267[a] | Pleasing |

Means with the same letter are not significantly different at 5 % DMRT

AROMA

Table 2 revealed the result of the aroma as affected by different treatments. It shows that embutido processed with 1 tablespoon of dried rosemary leaves and embutido processed with 2 tablespoons of rosemary were rated by the panelist with desirable in the organoleptic rating. Embutido with 1 and 2 tablespoons of rosemary leaves were both desirable but based on the numerical value, embutido processed with 2 tablsespoon of rosemary leaves had the highest value for aroma, and moderately desirable was the verbal description for embutido processed without rosemary leaves.

Statistical analysis revealed significant differences among treatment, embutido processed with 1 table spoon of rosemary leaves are not significantly different from embutido processed with 2 tablespoons of rosemary, but treatment 1 and 2 are significantly different from treatment 0 embutido processed without rosemary leaves. It also shows that embutido processed with rosemary leaves gave desirable aroma to the product.

Table 2. Aroma of embutido

| TREATMENT | NUMERICAL MEAN | VERBAL RATING |
|---|---|---|
| $T_O$= embutido without rosemary | $1.8133^a$ | Moderately desirable |
| $T_1$= embutido with 1 tbsp rosemary | $1.3200^b$ | Desirable |
| $T_2$= embutido with 2 tbsp rosemary | $1.4133^b$ | Desirable |

Means with the same letter are not significantly different at 5 % DMRT

FLAVOR

Table 3 shows the result of embutido processed with different levels of rosemary leaves affecting the flavor of the product. In the organoleptic rating, embutido without rosemary and embutido processed with 1 table spoon of rosemary were rated with very good. While embutido processed with 2 tablespoons of rosemary was rated with good by the taste of panelist.

Statistical analysis revealed significant differences among treatments. It also shows that embutido processed with 1 tablespoon of rosemary leaves do not differ significantly from embutido processed without rosemary leaves. Embutido processed with 2 tablespoon of rosemary do not differ significantly from embutido processed without rosemary leaves, but embutido with 1 tablespoon of rosemary significantly differ from embutido processed with 2 tablespoons of rosemary leaves. Addition of rosemary leaves affects the flavor of the embutido.

Table 3. Flavor of embutido

| TREATMENT | NUMERICAL MEAN | VERBALRATING |
|---|---|---|
| $T_O$= embutido without rosemary | $1.4133^{ab}$ | Very good |
| $T_1$= embutido with 1 tblsp rosemary | $1.2800^{b}$ | Very good |
| $T_2$= embutido with 2 tblsp rosemary | $1.5333^{a}$ | Good |

Means with the same letter are not significantly different at 5 % DMRT

TENDERNESS

Table 4 Shows that embutido in the different treatment were all rated as very good by the panelist. Numerically they had differences, embutido processed without rosemary leaves ha 1.4867, embutido processed with 1 tablespoon of rosemary had 1.3867 and embutido processed with 2 tablespoons of rosemary had 1.4667. Tenderness shows no difference among the treatment based on the verbal description during the organoleptic. Statistical analysis revealed no significant differences among the treatments. It also implies that embutido processed with and without rosemary leaves had similar tenderness numerically and verbally. Addition of rosemary leaves do not affect and contribute on the tenderness of the processed embutido.

Table 4. Tenderness of embutido

| TREATMENT | NUMERICAL MEAN | VERBAL RATING |
|---|---|---|
| $T_O$= embutido without rosemary | 1.4867[a] | very good |
| $T_1$= embutido with 1 tbsp rosemary | 1.3867[a] | Very good |
| $T_2$= embutido with 2 tbsp rosemary | 1.4667[a] | Very good |

Means with the same letter are not significantly different at 5 % DMRT

ACCEPTABILITY

Table 5 shows the evaluation of acceptability of the different treatment processed product with different levels of dried rosemary leaves. In using rosemary leaves, it shows numerical differences in the organoleptic rating by the taste panels. Embutido processed with 1 tablespoon of dried rosemary leaves was rated with like very much. Embutido processed without dried rosemary leaves and embutido processed with 2 tablespoons of dried rosemary leaves were rated with like moderately by the panelist. Embutido with 1 tablespoon of rosemary was likely much accepted than the other treatments.

Statistical analysis revealed that there were significant differences among the treatments. Embutido processed with 1 tablespoon of rosemary do not differ from embutido processed without rosemary, also Embutido processed with 2 tablespoons of rosemary do not significantly differ from embutido processed without rosemary leaves. While embutido processed 1 tablespoon of rosemary significantly differ from embutido processed with 2 tablespoon of rosemary leaves as was shown in the table. It also implies that addition of dried rosemary leaves can improve the acceptability of the product.

Table 5. Acceptability of embutido

| TREATMENT | NUMERICAL MEAN | VERBAL RATING |
|---|---|---|
| $T_O$= embutido without rosemary | $1.5333^{ab}$ | Like moderately |
| $T_1$= embutido with 1 tbsp rosemary | $1.3333^{b}$ | Like very much |
| $T_2$= embutido with 2 tbsp rosemary | $1.6400^{a}$ | Like moderately |

Means with the same letter are not significantly different at 5% DMRT

Return on Investment

Table 6 Shows the sales, expenses, net income and the return on investment in making the processed embutido with different levels of dried rosemary leaves. The costof production shows that embutido without dried rosemary leaves had the lowest cost of production with 317.7. Embutido processed with 1 tablespoon of dried rosemary leaves had 329.26 and embutido processed with 2 tablespoon of dried rosemary leaves had the highest cost of production with 340.82. This is expected because all of the ingredients are the same expects for the level of dried rosemary leaves that has been added.

The return on investment shows that embutido processed without rosemary had the highest return on investment of 13.31% followed by embutido processed with 1 tablespoon of dried rosemary leaves of 9.34% and embutido processed with 2 tablespoons of dried rosemary leaves of 5.63%.

Table 6. Return on Investment (%)

| TREATMENT | SALES (Php) | EXPENSES (Php) | NET INCOME (Php) | ROI (%) |
|---|---|---|---|---|
| Processed embutido Without rosemary | 360 | 317.7 | 42.3 | 13.31 |
| Processed embutido With 1 tablespoon of Roseamary | 360 | 329.26 | 41.8 | 9.34 |
| Processed embutido With 2 tablespoons of Rosemary | 360 | 340.82 | 42.3 | 5.63 |
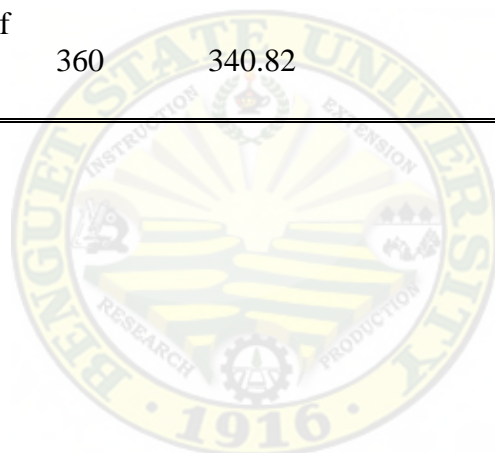
## SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

      This was conducted at the Meat Processing Laboratory Section, Department of Animal Science, College of Agriculture, Benguet State University, La Trinidad Benguet. The study was conducted to determine the acceptability of embutido processed with rosemary, to determine the production cost and profitability of processed embutido with rosemary and to determine the shelf life of the product. A total of 25 panelists were invited to evaluate the processed embutido without dried rosemary leaves as well as that which was processed with different levels of dried rosemary leaves. The panels of tasters are composed of five persons from the students, teachers, housewives, food servers and dieticians.

Results of the statistical analysis of the study revealed that there were significant difference between the aroma, flavor and acceptability. As for the aroma, embutido processed with 1 table spoon and 2 tablespoons of rosemary was rated with desirable and embutido processed without rosemary leaves was rated with moderately desirable by the panelist during the organoleptic rating. For the flavor, the panelist had a verbal description of very good in the embutido processed without and embutido processed with 1 tablespoon of rosemary leaves while for the embutido processed with 2 tablespoons of rosemary it was rated with good. For the acceptability, like moderately was the verbal description for the embutido processed without and embutido processed with 2 tablespoons of rosemary leaves and for the embutido processed with 1 tablespoon of rosemary leaves it was rated with like very much. For the appearance, embutido processed with 1 tablespoon of rosemary leaves was rated with very pleasing and

embutido processed without and embutido processed with 2 tablespoons of rosemary leaves was rated with pleasing. As for the tenderness, all the three treatment were rated with very good. There were no significant differences in terms of appearance and tenderness as was based on the statistical analysis.

Embutido with and without dried rosemary leaves were generally accepted by the twenty five panelists in terms of appearance, aroma, tenderness, flavor and acceptability.

Conclusion

Based on the result of the study, it is therefore concluded that rosemary leaves can be used as a spices ingredients to other processed product not just to embutido. Based on the aroma, flavor and acceptability of embutido processed with rosemary, this can help to improve the quality of processed products to compete with the commercial ones that were bought in the market. Embutido processed with rosemary are better compared to embutido without rosemary.

Recommendation

It is therefore recommended that further study should be made to improve the quality of different processed products. It is also recommended that in using rosemary, the level of 1 table spoon per 1 kilogram which may be just enough to add to the aroma and flavor of the product. It is also recommended to use rosemary leaves in making embutido. The study showed that embutido processed with rosemary leaves can improve the quality in terms of aroma, flavor and acceptability.

# LITERATURE CITED

AL-SEREITI MR, Abu-Amer KM, Sen P. Pharmacology of rosemary (Rosmarinus officinalis Linn.) and its therapeutic potentials. Indian J Exp Biol 1999 1999.

BURNHAM INSTITUTE FOR MEDICAL RESEARCH (BIMR) 2007. Rosemary chicken protects your brain from free radicals. Retrieved January 1, 2009 from http://www.sciencedaily.com/releases/2007/10/0710302210.htm

BOSWORTH, S. 2001. Rosemary. Retrieved April 08, 2004 from http://spec.lib.vt.edu/culinary/CulinaryThymes/2001_02/02Rosemary.html

BURKHURD, P. R..1999. "Plant-induced seizures: reappearance of an old p problem". *Journal of Neurology* 246 (8): 667–670. doi:10.1007/s004150050429. PMID 10460442.

BROWN D**.**1995. Encyclopedia of Herbs and their Uses. Dorling Kindersley, London.

CULPEPER 2004. Fewer toxins and more nutrients Retrieved August 23, 2008. from www.ediblenature.com.

FALSETTO, S. 2009 "The Medicinal Herb Rosemary: A Plant Profile of Rosemary and its Healing Properties" Retrieved July 14, 2009 from http://medicinalplants.suite101.com/article.cfm/the_medicinal_herb_rosemary#ixz0000000Kr

KEVILLE, K. 2007 "Aromatherapy: Rosemary." Retrieved March 06, 2009 from HowStuffWorks.com.<http://health.howstuffworks.com/aromatherapy rosemary.htm

HERST 2001. PDR for Herbal Medicines: Medical Economics Company.

MOSS, M. 2003. "Aromas of rosemary and lavender essential oils differentially a affect cognition and mood in healthy adults". *International Journal of Neuroscience* 113 (1): 15–38. doi:10.1080/00207450390161903.

MUMTAZ.K.I. 2007. Method of food preservation and sterilization. Retrived from h Http://www.Bawarchi.com/health/food-preserve1.hmtl.

EMBAR 2000. Nutrient content tables. Herbs and spices.retreivedMay 20, 2008 from www.veganpeace.com.

**Appendix**

Table 1. Appearance of Embutido

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_O$ | 1.6 | 1.48 | 1.52 | 4.6 | 1.5333 |
| $T_1$ | 1.6 | 1.4 | 1.16 | 4.16 | 1.3866 |
| $T_2$ | 1.68 | 1.76 | 1.44 | 4.88 | 1.6266 |
| TOTAL | 4.88 | 4.64 | 4.12 | 13.84 | 1.5155 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DEGREES OF FREEDOM | SUM OF SQUARES | MEAN OF SQUARES | COMPUTED F | P>F |
|---|---|---|---|---|---|
| TREATMENT | 2 | 0.08782222 | 0.0431111 | $1.65^{ns}$ | 0.2691 |
| ERROR | 6 | 0.600000 | 0.02666667 | | |
| TOTAL | 8 | 0.24782222 | | | |

$^{ns}$ = Non significant                    CV =10.7748

Appendix Table 2. Tenderness of Embutido

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_O$ | 1.68 | 1.5 | 1.28 | 4.46 | 1.4866 |
| $T_1$ | 1.6 | 1.14 | 1.16 | 4.16 | 1.3866 |
| $T_2$ | 1.72 | 1.36 | 1.32 | 4.4 | 1.4666 |
| TOTAL | 5 | 4.26 | 3.76 | 12.96 | 1.4466 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DEGREES OF FREEDOM | SUM OF SQUARES | MEAN OF SQUARES | COMPUTED F | P>F |
|---|---|---|---|---|---|
| TREATMENT | 2 | 0.01680000 | 0.00840000 | $0.18^{ns}$ | 0.8367 |
| ERROR | 6 | 0.27440000 | 0.04573333 | | |
| TOTAL | 8 | | | | |

$^{ns}$ = Non significant                                                        CV = 14.78250

Appendix Table 3. Aroma of Embutido

| TREATMENT | I | II | III | TOTAL | MEAN |
|---|---|---|---|---|---|
| $T_O$ | 2.08 | 1.80 | 1.56 | 5.49 | 1.8133 |
| $T_1$ | 1.52 | 1.24 | 1.20 | 3.96 | 1.32 |
| $T_2$ | 1.40 | 1.36 | 1.48 | 4.24 | 1.4133 |
| TOTAL | 5 | 4.4 | 4.24 | 13.64 | 1.5155 |

(REPLICATION heading spans I, II, III)

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DEGREES OF FREEDOM | SUM OF SQUARES | MEAN OF SQUARES | COMPUTED F | P>F |
|---|---|---|---|---|---|
| TREATMENT | 2 | 0.41208889 | 0.20604444 | 6.07* | 0.0362 |
| ERROR | 6 | 0.20373333 | 0.03395556 | | |
| TOTAL | 8 | 0.61582222 | | | |

* = significant                     CV = 12.15860

*Evaluation of Embutido Processed with dried "Rosemary" leaves.*
*AMCAY, JENALYN B. November 2009.*

Appendix Table 4. Flavor of Embutido

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_O$ | 1.52 | 1.4 | 1.32 | 4.24 | 1.4133 |
| $T_1$ | 1.32 | 1.24 | 1.28 | 3.84 | 1.28 |
| $T_2$ | 1.68 | 1.48 | 1.49 | 4.6 | 1.5333 |
| TOTAL | 4.52 | 4.12 | 4.04 | 12.68 | 1.4088 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DEGREES OF FREEDOM | SUM OF SQUARES | MEAN OF SQUARES | COMPUTED F | P>F |
|---|---|---|---|---|---|
| TREATMENT | 2 | 0.0963556 | 0.04881778 | 5.11* | 0.0506 |
| ERROR | 6 | 0.5653333 | 0.00942222 | | |
| TOTAL | 8 | 0.15288889 | | | |

* = significant                                    CV = 6.889694

Appendix Table 5. Acceptability of Embutido

| TREATMENT | REPLICATION | | | TOTAL | MEAN |
|---|---|---|---|---|---|
| | I | II | III | | |
| $T_O$ | 1.60 | 1.48 | 1.52 | 4.6 | 1.5333 |
| $T_1$ | 1.40 | 1.36 | 1.24 | 4 | 1.3333 |
| $T_2$ | 1.76 | 1.72 | 1.44 | 4.92 | 1.64 |
| TOTAL | 4.76 | 4.56 | 4.2 | 13.52 | 1.5022 |

ANALYSIS OF VARIANCE

| SOURCE OF VARIATION | DEGREES OF FREEDOM | SUM OF SQUARES | MEAN OF SQUARES | COMPUTED F | P>F |
|---|---|---|---|---|---|
| TREATMENT | 2 | 0.14542222 | 0.07271111 | 5.31* | 0.0470 |
| ERROR | 6 | 0.08213333 | 0.01368889 | | |
| TOTAL | 8 | 0.22755556 | | | |

* = significant                                                    CV = 7. 788430%

Appendix Table 6. Total cost of processed embutido per kilogram (Php)

| INGREDIENTS | EMBUTIDO PROCESSED WITHOUT ROSEMARY LEAVES | EMBUTIDO PROCESSED WITH 1 TBLSPN ROSEMARY LEAVES | EMBUTIDO PROCESSED WITH 2 TBLSPN ROSEMARY LEAVES |
|---|---|---|---|
| Refined salt | .14 | .14 | 0.14 |
| Condensed milk | 22.16 | 22.16 | 22.16 |
| Dried rosemary leaves | - | 11.56 | 23.12 |
| Ground black pepper | .50 | .50 | .50 |
| Onions | 4.44 | 4.44 | 4.44 |
| Garlic | 2.35 | 2.35 | 2.35 |
| Raisins | 15.38 | 15.38 | 15.38 |
| Green peas | 7.50 | 7.50 | 7.50 |
| Hotdog | 26.25 | 26.25 | 26.25 |
| Flour | 1.46 | 1.46 | 1.46 |
| Cornstarch | 1.27 | 1.27 | 1.27 |
| Fresh eggs | 8.33 | 8.33 | 8.33 |
| Soy | 0.67 | 0.67 | 0.67 |
| Cheese | 7.90 | 7.90 | 7.90 |
| Sugar | 1.19 | 1.19 | 1.19 |
| Bread | 4.33 | 4.33 | 4.33 |
| Cooking oil | 10.83 | 10.83 | 10.83 |
| Carrots | 13.00 | 13.00 | 13.00 |
| Pork meat | 190.00 | 190.00 | 190.00 |
| Total cost of Production (Php) | 317.7 | 329.26 | 340.82 |
| Gross Income | 360 | 360 | 360 |
| Net Income | 42.3 | 41.8 | 42.3 |
| ROI (%) | 13.31 | 9.34 | 5.63 |

Appendix Table 7. Summary of numerical values and their corresponding verbal
description used in evaluating the different treatments

| CHARACTERISTICS | NUMERICAL RATING | INTERVAL | VERBAL DESCRIPTION |
|---|---|---|---|
| Appearance | 1 | 1.00-1.49 | Very pleasing |
| | 2 | 1.50-2.49 | Pleasing |
| | 3 | 2.00-3.49 | Slightly Dull |
| | 4 | 3.50-4.49 | Dull |
| | 5 | 4.50-5.00 | Very dull |
| Aroma | 1 | 1.00-1.49 | Desirable |
| | 2 | 1.50-2.49 | Moderately desirable |
| | 3 | 2.00-3.49 | Slightly desirable |
| | 4 | 3.50-4.49 | Slightly undesirable |
| | 5 | 4.50-5.00 | Undesirable |
| Tenderness | 1 | 1.00-1.49 | Very good |
| | 2 | 1.50-2.49 | good |
| | 3 | 2.00-3.49 | slightly tender |
| | 4 | 3.50-4.49 | Slightly tough |
| | 5 | 4.50-5.00 | very tough |
| Flavor | 1 | 1.00-1.49 | Very good |
| | 2 | 1.50-2.49 | good |
| | 3 | 2.00-3.49 | fair |
| | 4 | 3.50-4.49 | poor |
| | 5 | 4.50-5.00 | very poor |
| Acceptability | 1 | 1.00-1.49 | Like very much |
| | 2 | 1.50-2.49 | Like moderately |
| | 3 | 2.00-3.49 | Dislike |
| | 4 | 3.50-4.49 | Moderately dislike |
| | 5 | 4.50-5.00 | Dislike very much |

Appendix A
Sample Score Card

Instruction:  Please evaluate the following samples. Check your answer that best describes the qualities of meat on the space provided. The best description And 1 is the highest score.

Name: _____

_____

**REPLICATION 1**

| | | APPEARENCE | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very pleasing | **2** Pleasing | **3** Slightly dull | **4** Dull | **5** Very Dull |
| $T_0$ | $R_1$ | | | | | |
| $T_1$ | $R_1$ | | | | | |
| $T_2$ | $R_1$ | | | | | |

| | | AROMA | | | | |
|---|---|---|---|---|---|---|
| | | **1** Desirable | **2** Moderately Desirable | **3** Slightly Desirable | **4** Slightly Undesirable | **5** Undesirable |
| $T_0$ | $R_1$ | | | | | |
| $T_1$ | $R_1$ | | | | | |
| $T_2$ | $R_1$ | | | | | |

| | | TENDERNESS | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very Good | **2** Good | **3** Slightly Tender | **4** Slightly Tough | **5** Very Tough |
| $T_0$ | $R_1$ | | | | | |
| $T_1$ | $R_1$ | | | | | |
| $T_2$ | $R_1$ | | | | | |

| | | FLAVOR | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very Good | **2** Good | **3** Fair | **4** Poor | **5** Very Poor |
| $T_0$ | $R_1$ | | | | | |
| $T_1$ | $R_1$ | | | | | |
| $T_2$ | $R_1$ | | | | | |

| | | ACCEPTABILITY | | | | |
|---|---|---|---|---|---|---|
| | | **1** Like Very Much | **2** Like Moderately | **3** Dislike | **4** Moderately Dislike | **5** Dislike Very Much |
| $T_0$ | $R_1$ | | | | | |
| $T_1$ | $R_1$ | | | | | |
| $T_2$ | $R_1$ | | | | | |

Name: _____
_____

**REPLICATION 2**

| | | APPEARENCE | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very pleasing | **2** Pleasing | **3** Slightly dull | **4** Dull | **5** Very Dull |
| $T_0$ | $R_2$ | | | | | |
| $T_1$ | $R_2$ | | | | | |
| $T_2$ | $R_2$ | | | | | |

| | | AROMA | | | | |
|---|---|---|---|---|---|---|
| | | **1** Desirable | **2** Moderately Desirable | **3** Slightly Desirable | **4** Slightly Undesirable | **5** Undesirable |
| $T_0$ | $R_2$ | | | | | |
| $T_1$ | $R_2$ | | | | | |
| $T_2$ | $R_2$ | | | | | |

| | | TENDERNESS | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very Good | **2** Good | **3** Slightly Tender | **4** Slightly Tough | **5** Very Tough |
| $T_0$ | $R_2$ | | | | | |
| $T_1$ | $R_2$ | | | | | |
| $T_2$ | $R_2$ | | | | | |

| | | FLAVOR | | | | |
|---|---|---|---|---|---|---|
| | | **1** Very Good | **2** Good | **3** Fair | **4** Poor | **5** Very Poor |
| $T_0$ | $R_2$ | | | | | |
| $T_1$ | $R_2$ | | | | | |
| $T_2$ | $R_2$ | | | | | |

| | | ACCEPTABILITY | | | | |
|---|---|---|---|---|---|---|
| | | **1** Like Very Much | **2** Like Moderately | **3** Dislike | **4** Moderately Dislike | **5** Dislike Very Much |
| $T_0$ | $R_2$ | | | | | |
| $T_1$ | $R_2$ | | | | | |
| $T_2$ | $R_2$ | | | | | |

Name: _____

_____

**REPLICATION 3**

| | | APPEARANCE | | | | |
|---|---|---|---|---|---|---|
| | | **1**<br>Very pleasing | **2**<br>Pleasing | **3**<br>Slightly dull | **4**<br>Dull | **5**<br>Very Dull |
| $T_0$ | $R_3$ | | | | | |
| $T_1$ | $R_3$ | | | | | |
| $T_2$ | $R_3$ | | | | | |

| | | AROMA | | | | |
|---|---|---|---|---|---|---|
| | | **1**<br>Desirable | **2**<br>Moderately Desirable | **3**<br>Slightly Desirable | **4**<br>Slightly Undesirable | **5**<br>Undesirable |
| $T_0$ | $R_3$ | | | | | |
| $T_1$ | $R_3$ | | | | | |
| $T_2$ | $R_3$ | | | | | |

| | | TENDERNESS | | | | |
|---|---|---|---|---|---|---|
| | | **1**<br>Very Good | **2**<br>Good | **3**<br>Slightly Tender | **4**<br>Slightly Tough | **5**<br>Very Tough |
| $T_0$ | $R_3$ | | | | | |
| $T_1$ | $R_3$ | | | | | |
| $T_2$ | $R_3$ | | | | | |

| | | FLAVOR | | | | |
|---|---|---|---|---|---|---|
| | | **1**<br>Very Good | **2**<br>Good | **3**<br>Fair | **4**<br>Poor | **5**<br>Very Poor |
| $T_0$ | $R_3$ | | | | | |
| $T_1$ | $R_3$ | | | | | |
| $T_2$ | $R_3$ | | | | | |

| | | ACCEPTABILITY | | | | |
|---|---|---|---|---|---|---|
| | | **1**<br>Like Very Much | **2**<br>Like Moderately | **3**<br>Dislike | **4**<br>Moderately Dislike | **5**<br>Dislike Very Much |
| $T_0$ | $R_3$ | | | | | |
| $T_1$ | $R_3$ | | | | | |
| $T_2$ | $R_3$ | | | | | |