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RESEARCH PAPER

Effect of packaging material on quality of egg with gravy (ready-to-eat) during storage

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SUMMARY :

The objective of this study was to investigate physico-chemical properties, the microbial load and sensory properties changes of ready-to-eat product, egg with gravy packed in different packaging material and stored under various conditions. The experimental packaging material were: Retort pouches, Polypropylene (PP), Low density poly ethylene (LDPE) and storage conditions were: ambient (27±5 °C) and refrigerated (12 and 15°C) conditions. The egg with gravy was stored for a period of 45 days and tested for pH of gravy, colour (albumin, yolk, and gravy), TSS, hardness, springiness and moisture content, microbial load and sensory assessment of odour, colour and appearance. Of the three packaging materials, retort pouch recorded a minimum bacterial load of 2.89 x 10^2 and 5.3 x 10^2 cfu/gram at 12 and 15°C after 45 days of storage, respectively. According to the sensory evaluation, egg with gravy packed in PP and LDPE resulted unacceptable after 14 and 21 days of storage, respectively whereas the retort pouch-packed egg with gravy was still acceptable.

KEY WORDS : Egg with gravy, Packaging, Storage, Shelf life, Sensory evaluation

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India has made significant progress in agriculture and food sectors since independence. Now, this is the time to establish better food processing and its marketing infrastructures for Indian Industries to supply good quality and the safest processed foods in the form of ready to eat foods to its ever increasing consumer. Realizing the importance, Indian Government is providing more infrastructures for this processed food sector. No excise duty for RTE and 100 % tax deduction for the first 10 years for all new ready to eat and other food processing industries. This helps the food processor to cut down their prices and spreads its flavors to the consumer not only in our country but also throughout the world.

Processing of egg in time with above principle will not only avoid post harvest loses but also reduce the short fall in the egg availability in the global scenario. There are many food products made from different food materials are already available in the market in various forms.

Processing and packaging of egg with gravy in flexible pouches as designed in present study will become one of such product made available to the consumers in ready-to-eat (RTE) form in wholesome manner. This will increase the egg consumption by different age groups and meet the needs of many egg consumers.

Retort pouches, polypropylene (PP) and low density polyethylene (LDPE) are some of the flexible packaging materials serves available for packaging ready to eat products. Retort pouches basically consist of different packaging films of polyethylene, nylon, aluminium foil and polypropylene made by following lamination or co extrusion technology which can withstand high process temperature and pressure. The retort processed foods meet the specific needs of convenience, nutritional adequacy, shelf stability, storage, distribution to the centers and have become very popular after 2002, because of promotional support given by Indian Government. The most important feature of the flexible pouches is its easy handling and usage among the people and less costly as compared to other packages like tins, cans etc. Among these, retort pouches are unique which suits the processing of food contents at temperatures around 121^0 C. To prepare the foods of different kinds, taste etc., it is important that the foods should have increased shelf life so that it can be transported and made available at far off places too.

Now a days, irrespective of position of families either in rural or urban areas, both husband and wife are going for jobs to meet the family financial requirements. Because of this, the time availability for the lady family member to work in the kitchen gets reduced. To overcome this problem, ready-to-eat (RTE) materials are to be made available for regular usage among consumers. This type of demand driven ready to food material are going to rule the super markets and departmental stores in the future. However, in the case of egg, as on date there is no ready-to-eat (RTE) food with spicy supplement. If any such product is prepared, processed and stored in all grocery shops, it is possible to increase the sale and indirectly increase the consumption of egg and also decrease the post harvest losses. Thus, the aim of this work was to study the shelf life of egg with gravy storage under three different packaging and three storage conditions. The sensorial and microbial quality, pH, colour and textural parameters were determined at 15, 30 and 45 days of storage.

EXPERIMENTAL METHODS

Fresh poultry eggs layed by healthy layers were procured from M/s Anbu Poultry farm Muthukkalipati village, Rasipuram (Tk), Namakal (Dt), Tamil Nadu. Medium sized eggs with 55±5g 'A' grade quality were chosen for the present.

The optimized methods were followed for the preparation of gravy, boiling of eggs, packaging of eggs in gravy, and thermal processing of product.

Treatment details:

The storage studies were carried out on the ready-to-eat gravy with egg packed in order to find its shelf life. The storage studies were conducted at three different temperature and three packaging materials as mentioned in Table A.

Table A : Details of storage conditions

Treatments	Packaging materials	Storage conditions
T_1	Retort	Ambient
T_2	Poly propylene	Ambient
T_3	Low density polyethylene	Ambient
T_4	Retort	Refrigerator (12°C)
T_5	Poly propylene	Refrigerator (12°C)
T_6	Low density polyethylene	Refrigerator (12°C)
T_7	Retort	Refrigerator (15°C)
T_8	Poly propylene	Refrigerator (15°C)
T_9	Low density polyethylene	Refrigerator (15°C)

Physical, biochemical and microbial qualities:

The changes in the physical, biochemical and microbial qualities of poultry eggs and gravy packed in three different packaging material were analyzed at regular intervals of 8 and 15 days to determine the effects of storage temperature on quality of packaged products. The studies were conducted for five continuous weeks of storage. The parameters *viz*., colour of the poultry egg albumin and yolk, moisture content of albumin, hardness and springiness of egg, pH and TSS of the gravy and microbial qualities were analyzed. All the experiments were carried out in triplicate and the mean values were taken for the analysis.

Glass rod pH meter (Micro processor based pH meter, 1012E, Environmental and Scientific Instr. Co., India) was used to measure the pH. Colourflex (Hunter Associates Laboratory, Inc., Reston, Virgina, USA) meter was used for the measurement of colour The hardness and springiness of boiled egg before and after heat treatment were determined using texture analyzer. Protein content was estimated by Kjeldahl method using a laboratory Kjel plus equipment (Pelicon equipments, model-REC 22238-A2, Chennai). The aerobic micro flora *viz.,* bacteria and yeast present in the sample during storage were assessed by dilution plate technique with nutrient agar and potato dextrose agar mediums obtained from authenticated laboratories.

Sensory evaluation:

An organoleptic evaluation of the product was done for colour, flavour, texture, taste and overall acceptability (Ranganna, 1997). All the samples were displayed to the judges under ambient conditions. Nine-point Hedonic scale was used as sensory evaluation score card to bring out the inherent characteristics acceptability of particular product.

Cost analysis:

The cost of production of egg with gravy was worked

out by considering the building cost (rental basis), machinery cost, raw material cost and labour cost after making reasonable assumptions wherever necessary.

EXPERIMENTAL FINDINGS AND ANALYSIS

The results of the present study as well as relevant discussions have been presented under following sub heads:

Quality analysis of eggs in gravy packaged in flexible pouches:

The flexible pouches packaged with boiled poultry eggs in gravy samples were thermally processed and stored at room temperature (27±5°C), refrigerated condition at 12 and 15°C for one and half months to conduct shelf life studies.

Changes in pH values of gravy during storage

From the Fig. 1, it is evident that up to 15 days of storage the samples packed in all three types of pouches and stored at atmospheric temperature maintained a pH value of 4.9±0.6. Study clearly showed that the pouches containing eggs in gravy packed using PP, LDPE and retort pouches can be stored comfortably for 16, 24 and 32 days, respectively under ambient condition of 25±2°C. The analysis of egg samples packaged in three types of pouches, stored under refrigerated condition of 12 and 15ºC and stored for 45 days clearly showed that the pH values of samples were well below 5.0. Similarly, Berry *et al*. (1999) reported a decrease in pH value of gravy used for packing vegetable curry during storage at 5 to 20ºC in different flexible packaging materials.

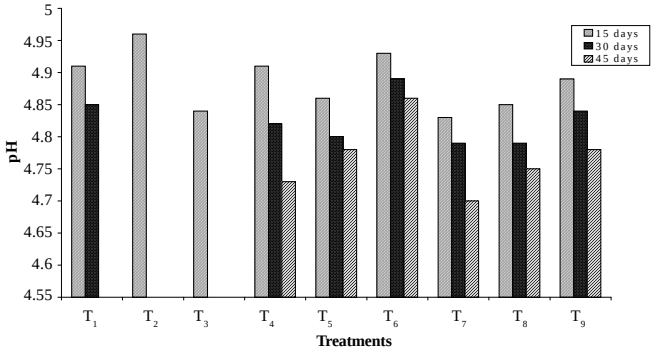

Fig. 1 : Effect of packaging materials, storage conditions and duration of storage on pH value of gravy packaged along with boiled eggs

Changes in total colour values of product during storage:

Changes in total colour value of gravy during storage:

The Fig. 2 (A) clearly indicates that under different storage conditions, irrespective of packaging materials there was change in total colour values of gravy with increase in days of storage. Among the three packaging materials studied, retort pouch stored at 15ºC showed less in total colour change values of 40.28 and 53% after 30 and 45 days of storage, respectively.

Changes in total colour value of egg yolk during storage:

Egg yolk in pouches stored at ambient condition recorded the total colour change values of 13.08, 17.70 and 7.81 in retort, PP and LDPE, respectively after 15 days of storage (Fig.3) and the contents of all these pouches were good for consumption. Whereas egg yolk packed in PP pouches recorded the highest colour change values among all the pouches stored under refrigerated condition (12°C) with increased value of 61.1 and 107.32% after 30 and 45 days of storage, respectively as compared to 15 days stored egg yolk at. Similarly, the egg yolk stored at 15ºC in retort

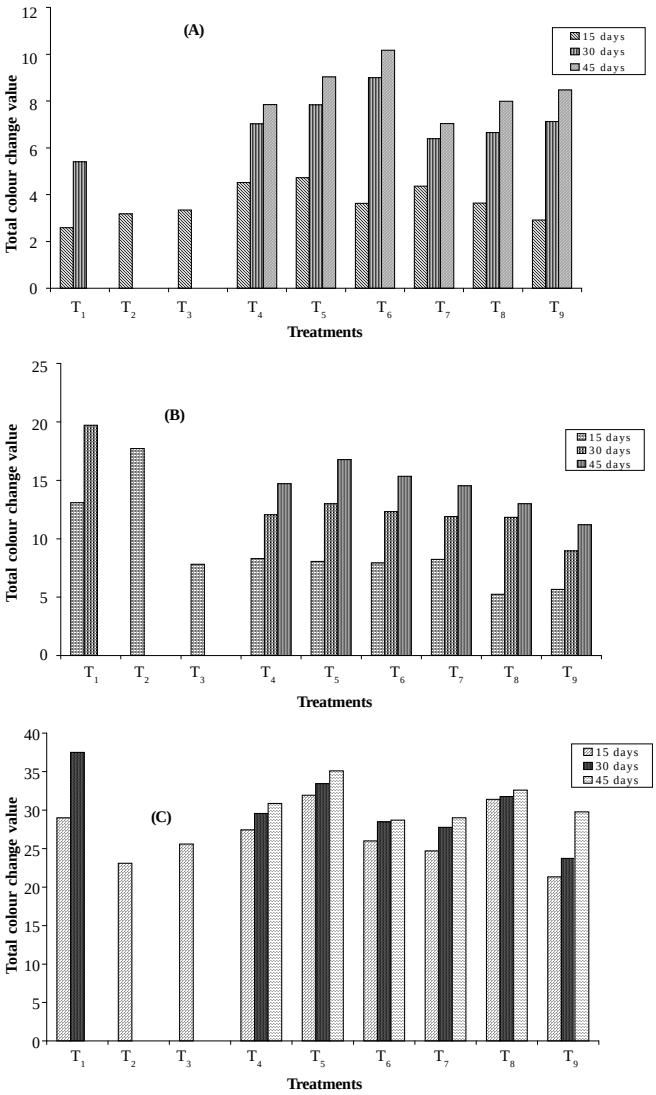

Fig. 2 : Effects of packaging materials, storage conditions and duration of storage on total colour change value (ÂE) of (A) Gravy (B) Egg yolk (C) Egg albumin

pouches showed more changes in ÄE values compared to other two flexible pouches as shown in Fig. 2(B).

Changes in total colour value of egg albumin during storage

Compared to egg yolk, the colour change values are more in case of albumin due to direct contact with gravy and its white colour. From the Fig. 2 (C), it is clear that egg albumin packed along with gravy and stored under ambient condition showed colour change values of 28.98, 23.08 and 25.58 for retort, PP and LDPE after 15 days of storage, respectively. The total colour change values were comparatively less at 15ºC as compared to 12ºC refrigerated storage. Egg albumin in PP pouches recorded 31.93, 33.42 and 35.07 as total colour change values after 15, 30 and 45 days of storage, respectively at 12ºC storage condition. Egg albumin in retort pouches showed a colour change of 7.76 and 12.47% after 30 and 45 days of storage as compared to 15 days total colour change values at12ºC storage condition. Egg albumin in LDPE showed less total colour change values after 45 days of storage among all pouches stored under 12ºC refrigerated condition. The raise in colour change value between 30 and 45 days was only 0.24 which indicates saturation in the movement of colour pigments from gravy to albumin. Karthiswaran (2004) reported significant total colour changes in milky mushrooms stored in cans which confirmed the findings in the present study.

Changes in the moisture content of egg albumin during storage:

It is evident from Fig. 3 that irrespective of packaging material and storage condition, increase in storage period slightly increased the moisture content of albumin. Increase in moisture content of albumin portion placed in gravy may be due to migration of moisture from gravy to albumin and impermeable nature of retort pouch which did not allow any transfer of water vapour from inside of pouch to atmosphere. Moisture absorbed by the egg albumin was slightly more in case of 15ºC than 12ºC refrigerated storage indicating that increase in storage temperature increased the moisture migration. Among different pouches, because of impermeable nature, retort pouches maintained higher partial pressure of water inside and helped the egg albumin to absorb moisture at the end of 45 days of storage with values of 84.93 and 85% at 12 and 15 ºC storage temperature, respectively. Egg albumin in polypropylene pouches showed slightly lesser moisture values as compared to moisture content of albumin in LDPE pouches. On an average, egg albumin moisture content changed within 84±0.5% value when stored at refrigerated condition for 45 days.

Changes in the TSS value of gravy during storage:

From the Fig. 4, it is seen that, irrespective of packaging materials used and storage temperatures followed, increase in duration of storage period lowered the TSS value. Among the different samples studied, gravy packaged along with boiled eggs and stored at ambient condition recorded a maximum value of 13.3°Brix after 15 days of storage in retort pouch and polypropylene recorded a minimum value of 11.8°Brix after 45 days of storage at 12ºC refrigerated condition. In general, decrease in storage temperature decreased the ingredient diffusion rate and this may be the reason for the gravy packaged in pouches and stored under 12ºC storage condition recorded lesser TSS value as compared to 15ºC and ambient storage conditions. Figure also revealed that the decrease in TSS value of gravy packaged in pouches was more during first 15 days (0 to 15 days) as compared to last 15 days (30 to 45days) of storage. Among the two temperatures studied at refrigerated storage, gravy stored at 12ºC refrigeration showed less TSS value as compared to 15ºC storage. Also change in TSS value during the storage period between 15 and 45 days was very low. The figure clearly indicates that the change in TSS content was very low and kind of pouches did not show any appreciable variation. This

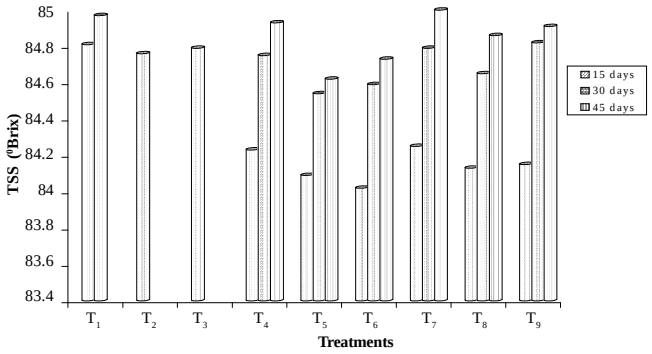

Fig. 3 : Effects of packaging materials, storage conditions and duration of storage on moisture content of egg albumin packaged along with gravy pouches

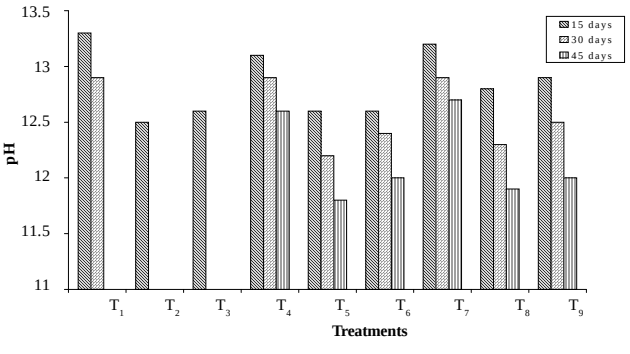

Fig. 4 : Effects of packaging materials, storage condition and duration of storage on total soluble solids (TSS) of gravy packaged along with boiled eggs

may be due to stabilization of TSS in gravy. Reni (2006) reported a decrease in TSS values of soya chunks in retort pouches during storage. The decrease in TSS value of gravy during storage is in line with earlier findings.

Change in the total protein content of egg in gravy during storage period:

From the Fig. 5, it is seen that increase in storage temperature slightly decreased the total protein content of egg packaged along with gravy in different flexible pouches. Studies conducted on pouches fit for consumption, retort pouch stored at 12^0C recorded the highest value of 13.62% and eggs packaged in polypropylene pouch stored for 15 days at ambient condition recorded the lowest value of 12.98%. Under refrigerated storage condition (12 and 15^0 C) irrespective of packaging material used, temperatures stored and storage period studied the protein content of egg placed in gravy was within 13.45± 0.16% range. Protein content of eggs packed in retort pouches and stored at 12^0 C for 15 days showed a very less change in total protein *i.e.* difference of 0.03% of total protein. Among all the flexible pouches stored at refrigerated storage, polypropylene recorded less total protein values of 13.39, 13.35 and 13.30% after 15, 30 and 45 days of storage, respectively. Low density polyethylene pouches recorded 0.11 to 0.09% changes in the value of total protein content when stored at 12 and 15ºC, respectively. Kaur and Ahmed (2000) reported a slight decrease in protein content of egg halwa when stored in refrigerated condition (5-10^0 C) for three months. A short decrease in protein content of egg (less than 0.5%) placed in gravy and stored at 12 and 15^0 C, in the present study is in line with the above findings.

Changes in hardness and springiness of the eggs packaged with gravy during storage period:

Change in hardness values of boiled eggs in gravy packaged in different pouches, thermally processed at 95±2^0 C, cooled and stored at different conditions are reported in Table 2. Eggs with gravy packed in retort, PP and LDPE pouches and stored at ambient condition, recorded hardness values of 10.32, 10.05 and 10.25 N, respectively after 15 days of storage. The eggs packed in LDPE pouch and stored at 15^0 C recorded minimum value of 11.43 after 15 days of storage but polypropylene pouches stored at 12^0 C for 45 days recorded maximum value of 12.63. Even under refrigerated condition, the hardness of the egg packed and stored at 12^0 C recorded higher values when compared to 15^0 C irrespective of packaging materials used and duration of storage studied. This may be due to higher moisture content of albumin recorded at 15^0 C than at 12^0 C.

From the Table 1, it is also evident that similar to the hardness values decrease in storage temperature increased the springiness value irrespective of packaging materials used and storage temperatures. Eggs packed with gravy and stored in ambient condition recorded the springiness values 0.754, 0.597 and 0.663, respectively for retort, PP and LDPE pouches after 15 days of storage. Among the different kinds of pouches containing eggs along with the gravy studied at refrigerated condition, eggs packaged along with gravy in LDPE pouch stored at 12^0 C recorded the minimum springiness value of 0.746 after 15 days storage and the egg samples stored along with gravy in polypropylene pouches recorded the maximum value of 0.867 after 45 days of storage at 12^0 C storage condition. Change in the springiness values of packaged eggs followed same trend as that of hardness value because of inter relation that exists between them. LDPE pouches stored at 12 and 15^0C refrigerated conditions showed slight change during storage and recorded the highest value of 0.823 at 12^0C refrigerated condition after 45 days of storage. The results of present study is at par with the experiments conducted by Yu and Lee (1995) to test the effect of storage at 5^0 C on bacterial flora and physical properties of Malaysian fish meat balls.

Table 1 : Changes in hardness and springiness value of boiled eggs packed along with gravy in different pouches and stored at different temperatures

Treatments	Hardness (N)				Springiness			
	Before heat Treatment	Immediately after 15 days	Immediately after 30 days	Immediately after 45 days	Before heat Treatment	Immediately after 15 days	Immediately after 30 days	Immediately after 45 days
T_1	10.63	10.32	10.25	10.01	0.693	0.754	0.725	-
T_2	10.63	10.05	-	-	0.693	0.597	-	-
T_3	10.63	10.25	-	-	0.693	0.663	-	-
T_4	10.63	11.98	12.02	12.58	0.693	0.816	0.831	0.845
T_5	10.63	11.52	11.97	12.63	0.693	0.811	0.829	0.867
T_6	10.63	11.43	11.75	12.15	0.693	0.808	0.809	0.823
T_7	10.63	11.36	11.67	12.06	0.693	0.801	0.807	0.808
T_8	10.63	11.49	11.85	12.24	0.693	0.809	0.813	0.817
T_9	10.63	11.23	11.56	11.73	0.693	0.746	0.756	0.810

Table 2 : Microbial load in boiled poultry eggs along with gravy packed in different pouches and stored at different conditions

Treatments	Bacteria (cfu)					Yeast (cfu)				
	Storage period (days)					Storage period (days)				
	8	16	24	32	45	8	16	24	32	45
T_1	$11.33x10^1$	$2.33x10^2$	$4.50x10^3$	$9.50x10^3$	$4.50x10^5$	3.5	5.0	8.3	9.3	$2.5x10^3$
T_2	$3.55x10^3$	$9.40x10^3$	$7.63x10^6$	$4.63x10^7$	$6.25x10^7$	4.7	9.1	$5.0x10^2$	$9.2x10^3$	$4.1x10^4$
T_3	$8.56x10^2$	$1.77x10^3$	$9.55x10^3$	$4.20x10^7$	$5.62X10^7$	3.9	8.1	9.1	$9.0x10^2$	$3.9x10^3$
T_4	$3.67x10^1$	$4.98x10^1$	$11.33x10^1$	$2.33x10^2$	$2.89x10^2$	1.3	1.9	2.3	4.5	5.6
T_5	$8.30x10^1$	$3.65x10^2$	$8.56x10^2$	$1.77x10^3$	$3.55x10^3$	2.2	2.9	3.3	4.5	6.5
T_6	$6.80x10^1$	$3.14x10^2$	$6.67x10^2$	$9.10x10^2$	$2.56x10^3$	1.3	2.0	3.2	3.9	6.3
T_7	$3.90x10^1$	$5.20x10^1$	$3.20x10^2$	$3.90x10^2$	$5.30x10^2$	1.6	2.2	3.7	6.1	6.3
T_8	$2.33x10^1$	$3.92x10^2$	$6.70x10^2$	$1.12x10^3$	$2.74x10^3$	2.3	3.2	5.2	6.9	8.0
T_9	$3.25x10^2$	$7.10x10^2$	$9.81x10^2$	$1.15x10^3$	$3.10x10^3$	1.8	2.5	3.6	5.6	7.0

Table 3 : Hedonic scale score values of boiled eggs in gravy packaged in flexible pouches and stored at ambient condition

Sr. No.	Parameters	Storage period (No. of days)								
		0	15			30			45	
			T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
1.	Flavour	9.0	8.0	7.5	7.5	7.5	-	-	-	-	-
2.	Colour	8.5	7.5	7.0	7.5	7.0	-	-	-	-	-
3.	Appearance	9.0	8.0	7.0	8.0	8.0	-	-	-	-	-
4.	Taste	9.0	8.0	7.5	8.0	7.5	-	-	-	-	-
5.	Odour	8.5	7.5	6.5	7.0	7.5	-	-	-	-	-
6.	Texture	9.0	8.5	8.0	8.5	8.0	-	-	-	-	-
7.	Overall acceptability	9.0	8.0	7.0	7.5	7.5	-	-	-	-	-

T_1- Retort pouch stored at ambient condition; T_2- Poly propylene pouch stored at ambient condition;
T_3 - Low density polyethylene pouch stored at ambient condition

Table 4 : Hedonic scale score values of boiled eggs in gravy packaged in flexible pouches and stored at 12°C refrigerated

Sr. No.	Parameters	Storage period (No. of days)								
		0	15			30			45	
			T_4	T_5	T_6	T_4	T_5	T_6	T_4	T_5	T_6
1.	Flavour	9.0	8.5	8.0	8.0	8.0	8.0	7.5	8.0	8.0	7.5
2.	Colour	8.5	8.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
3.	Appearance	9.0	8.0	8.5	8.5	8.5	8.0	8.0	8.0	8.0	8.0
4.	Taste	9.0	8.5	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
5.	Odour	8.5	8.0	8.0	7.5	8.0	8.0	7.5	8.0	7.5	8.0
6.	Texture	9.0	8.5	7.5	8.0	8.5	8.0	8.0	8.0	7.5	7.5
7.	Overall acceptability	9.0	8.5	8.0	8.0	8.5	8.0	8.0	8.0	7.5	8.0

T_4 - Retort pouch stored at 12±2 °C; T_5 - Poly propylene pouch stored at 12±2 °C; T_6 - Low density polyethylene pouch stored at 12±2 °C

Table 5 : Hedonic scale score values of boiled eggs in gravy packaged in flexible pouches and stored at 15°C refrigerated condition

Sr. No.	Parameters	Storage period (No. of days)								
		0	15			30			45	
			T_7	T_8	T_9	T_7	T_8	T_9	T_7	T_8	T_9
1.	Flavour	9.0	8.0	8.0	8.0	8.0	7.5	7.5	7.5	7.0	7.5
2.	Colour	8.5	7.5	7.5	7.5	8.0	7.5	7.5	7.5	7.0	7.5
3.	Appearance	9.0	8.5	8.5	8.5	8.5	8.5	8.0	8.0	8.0	8.0
4.	Taste	9.0	8.0	8.5	8.0	8.0	7.5	8.0	8.0	7.5	7.5
5.	Odour	8.5	8.0	8.0	7.5	8.0	7.5	7.5	8.0	7.5	7.0
6.	Texture	9.0	7.5	8.0	7.5	8.0	7.5	7.5	7.5	7.0	7.5
7.	Overall acceptability	9.0	8.0	8.5	8.0	8.0	7.5	7.5	8.0	7.5	7.5

T_7 - Retort pouch stored at 15±2° C; T_8 - Poly propylene pouch stored at 15±2 °C; T_9 - Low density polyethylene pouch stored at 15±2 °C

Analysis of microbial load in eggs packaged with gravy and stored for different periods and temperatures:

The cfu (colony forming units) values obtained in the present study for bacterial load are presented in Table 2. Boiled eggs packed along with gravy in polypropylene, low density polyethylene and retort pouches stored under ambient condition were spoiled after 16, 24 and 32 days, respectively. This clearly indicates that ambient storage conditions favored the microbial growth that in turn influenced all other parameters discussed earlier. Eggs packaged along with gravy in retort pouch stored under ambient condition did not show spoilage up to 32 day of storage. The egg products packaged in pouches stored under refrigerated condition showed less cfu values which indicate clearly the safety of egg and gravy. Berry *et al.* (1999) reported similar kind of results when they analyzed the samples of vegetable gravy packaged and stored for 12 months. Similarly Kaur and Ahmed (2000) reported the same increasing trend in cfu/g of ready to eat egg halwa when they packaged the samples in different pouches, stored at 5-10°C for three months. The cfu values obtained in PP, LDPE and retort pouches for duration of 16, 24 and 32 were within acceptable level of 10^4 cfu/ g under ambient condition. All the samples stored under refrigerated condition recorded less than 10^4 cfu/g and hence, safe for consumption after 45 days of storage.

Mean value of yeast forming units found during the analysis of eggs and gravy samples stored under different temperatures and pouches are given in Table 2. Yeast growth rate and its number were less as compared to bacteria in all the products packaged in different pouches and storage temperatures studied. Similar to bacteria, the cfu were higher in case of the PP and LDPE under ambient condition. A highest value of $4.1x10^4$ cfu/g was noted in case of PP, which indicated the spoilage of product (egg and gravy). All samples stored at 12 and 15^0 C up to 45 days recorded less than 10 cfu/g which indicated the microbiological safety of eggs packaged in the flexible pouches even after 45 days of storage. Product in pouches stored at 12^0 C refrigerated condition showed lesser cfu values compared to other two storage temperatures studied. It is interesting to note that LDPE pouches showed less values as for yeast as compared to polypropylene. The results obtained in the present study were at par with the results obtained by Kaur and Ahmed (2000).

Sensory evaluation of boiled eggs in gravy packaged in flexible pouches and stored for different periods and temperatures:

From the Table 3, it is clear that the product was liked extremely when it was evaluated immediately after preparation. In case of eggs packaged along with gravy in pouches and stored under ambient condition recorded lesser score values. Among them the products stored in retort pouch recorded a score value of 8.0 *i.e.* the product was liked very much by all judges. As the eggs in PP and LDPE pouches were good only for two and three weeks time, respectively and they recorded decreased values in the sensory score.

From the Table 4 and 5 it is evident that under 12^0 C storage condition, recorded better score values than 15^0 C. Among all pouches studied, products in retort pouches recorded a score value of 8.0 score value for overall acceptance under 12 and 15^0 C storage conditions, which indicates that the product was liked very much by the consumers. Similar results were reported by Sukhwinder and Ahmed (2000) when they analyzed sensory evaluation of ready-to-eat egg *Halwa* stored for three months under 5-10^0C refrigerated condition.

From the estimation, it is found that the cost of production of two eggs packaged in gravy packaged in retort, LDPE and PP was Rs. 13.80/-, Rs. 10.60/- and Rs. 10.55/-, respectively.

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