CHAPTER 5
CONCLUSION

The conclusions for the results of this research, which is a production of corn milk powders by foam-mat drying, are as followed:

1. Qualities of corn milk that used in this research were compared to raw sweet corns and a commercial corn milk band, Malee. The results showed clearly that the main nutrients, including fat, carbohydrate, protein, moisture content, fiber and ash, of raw sweet corn were much higher than those of the corn milk prepared for this study. The commercial corn milk had slightly higher values of fat and protein and had carbohydrate content almost double higher than those of the corn milk that used in this study. For the physical characteristic of the corn milk, the raw sweet corn was brighter (L* value of 67.80) as compared with the corn milk (L* value of 63.19 ± 1.64). This L* value of the corn milk was similar to the L* value of blanched sweet corns, which was 63.68. Beside the main nutrients, sweet corn also contains a fat-soluble vitamin, vitamin A and a water-soluble vitamin, vitamin C (ascorbic acid). It was found that the carotenoid content in the corn milk was 0.76 mg/100g, whereas raw sweet corn had 0.49 mg/100g in the form of β-carotene. For the content of vitamin C, the amount of the vitamin in the corn milk was 5.80±0.01 mg/100 ml which was lower than that in boiled sweet corns. For the microbiological characteristics, it was found that the initial amounts of microbial were $8.93x10^4 \pm 7.62x10^3$ cfu/g for Total Plate Count and $2.58x10^5 \pm 1.88x10^5$ cfu/g for yeast and mould. The percentage of extraction of the corn milk used in this study was 85.56 ± 7.85 %.

2. A combination of 25 % maltodextrin and a sugar addition at 15 ^{0}Brix with 2 % concentration GMS or 5 % concentration of GMS and methocel (1:1) could produce stable foams that had low density and syneresis rate and high overrun values. By using the 2 % concentration of GMS, stable foams which had a foam density of 0.13 ± 0.01 g/ml, a foam overrun of 642.68 ± 37.83 % and a syneresis rate of 0.10 ± 0.10 ml/min were obtained. Whereas applying the 5 % concentration of GMS and

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved

methocel (1:1) produced stable foams that had a foam density of 0.17 ± 0.02 g/ml, a foam overrun of 535.81 ± 51.22 % and a synerrsis rate of 0.15 ± 0.02 ml/min.

3. The suitable whipping time and temperature for making stable foams was 8 min at 60 °C. The lowest density of 0.14 ± 0.01 g/ml could be produced.

4. A 5 % concentration of GMS: methocel (1:1) with an addition of 63 g (31.5 % w/w) was the optimal type and amount of foaming agent to produce corn milk powders by foam-mat drying. This conclusion was made based on the characteristics of the produced foams and some properties of the final powders which included the lowest density value of 0.12 ± 0.01 g/ml, the lowest syneresis rate of 0.06 ± 0.01 ml/min, the highest overrun value of 698.93 ± 52.92 %, the highest dispersibility of 0.66 ± 0.07, the high rehydration property of 84.66 ± 0.19 %, and a high yield result of 27.27 ± 0.65 %. For the other powder characteristics included color, color of the reconstituted corn milks, solubility, carotenoid contents, a_w, moisture contents, the amount of total microorganisms, yeast and mold, these corn milk powders did not show any significant differences with other treatments.

5. A suitable drying parameters to produce corn milk powders was 70 ^{0}C for 70 min. These condition could produce the best powder quality within a reasonable short drying time and a high carotenoid content of 8.57 ± 0.78 μg/g. Beside that, drying the corn milk powders at this drying condition would produce samples with low numbers of microorganisms which were $4.27x10^2 \pm 2.64\ x10^2$ cfu/g for Total Plate Count and $5.50x10^2 \pm 8.08x10^1$ cfu/g for yeast and mold. Other powder qualities, included powder's color, color of reconstituted corn milks, solubility, dispersibility, rehydration, water activity and moisture content of the powder samples were not significantly different than other time and temperature of drying processes.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved

Suggestion

1. For further study to improve the taste and nutritional of corn milk powders made by foam-mat drying, an application of milk powder as a replacement of maltodextrin can increase the total soluble solid of corn milk and improve the characteristics of corn milk foams. The production of corn milk powders can be

applied for small-acale industries because of its short processes and a low cost production.

2. A hot air oven is not the best and suitable equipment for making corn milk powders for large food industries. Using a continuous vacuum or belt dryer is more suitable than a hot air drying due to continous process and high productivity.

3. The problem of using GMS as a foaming agent that was used in this research is difficult to be dissolved by simple stirring or done manually by hand shaking. An use of other foaming agent, i.e. egg albumin can be applied to eliminate the problem of GMS.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved