Storage stability of spray-dried tilapia meat powder produced under optimized condition

ABSTRACT

In this study, gelation characteristics, colour, moisture and water activity of spray-dried tilapia powder (SDTP) packed in polyethylene pouches under aerobic conditions were evaluated under refrigerated, ambient and accelerated storage conditions for up to 90 days. The spray dried powder contained 2.63% moisture, had least gelation concentration (LGC) of 8.67% and water activity of 0.255. The L*, b* and a* values of spray-dried tilapia powder was found to be 97.69, 1.51 and 0.12, respectively. At refrigerated storage temperature (4°C), the LGC ranged between 8-10% up to 90 days ($p<0.05$) of storage. Gelation capacity of the powder was not altered significantly up to 30 days when stored at 10°C and ambient temperature and after that the powder was found to form gel at slightly higher concentration between 9-12.75% and 9-14%, respectively. Significant loss of gelling ability over storage time was observed ($p<0.05$) for spray-dried tilapia powders stored at 40°C. The powder could retain its gelation capacity up to 60 days storage with LGC observed to be at 15% (w/v). However afterwards, the powder lost its gelling properties and no gel could be formed with tilapia powder even when higher than 15% concentration was employed. The complete loss of gelling properties was witnessed for powders stored at 60°C only after 15 days. The L value of spray-dried tilapia powder (SDTP) did not change significantly ($p>0.05$) when stored at 4°C and 10°C for up to 90 days The L value was found to decrease gradually ($p<0.05$) when stored at ambient and elevated temperatures and the most reduction was observed for the highest storage temperature of 60°C. The darkest powder with L* value of 85.4 was observed for powders stored at 60°C for 90 days. The moisture adsorption by SDTP was observed under refrigerated and ambient temperature, even though the value was still below 5% after 90 days of storage. However, under accelerated storage condition of 40°C and 60°C, the moisture content of the powder tends to decrease until 45 days and then slightly increased due to clumping of powder. Water activity also showed similar trend and lowest and highest value obtained was varied between 0.093-0.470. The half-life of the spray-dried tilapia powder kept at 10°C, ambient temperature and elevated temperature at 40°C were predicted to be approximately 14 months, 5 months and two and half months, respectively.

Keyword: Spray-drying; Tilapia powder; Storage stability