

COMMON GRAINS THAT SUPPORT LACTATING MOTHERS AND GROWTH PERFORMANCE OF PUPS IN ALBINO SWISS MICE

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Abstracts

The global economic meltdown has necessitated the search for more income alternative to counter the geometrical inflations, mice production is a profitable practice due to their short period of life cycle and rapid reproduction, to this instance, and search for an alternative cheap recipe to feeds Lactating mothers' is relevant. This experiment was conducted in Animal Unit Department of Biology and Microbiology, Nuhu Bamalli Polytechnic, Zaria in 2024 to investigate an appropriate feed from the local feed used in the locality that will reduce the stress of breastfeeding of Lactating mothers in maintaining their body weights in relation to their Pups growth at gestation and after parturition to the weaning periods. Wheat, Yellow guinea and Sorghum bicolor corns mixed to 100% for each combinations (25:50:25, 50:25:25, 70:15:15, 60:20:20, 30:40:30, 15:70:15, 15:15:70, 35:35:30, 20:40:40 and 33:33:33) were used to feed ten (Groups A-J) pregnant albino Swiss mice for two weeks pre-parturition acclimatization and four weeks post-parturition, feed supplied and feed intake, initial and final weights were recorded every day at both pre and post-parturition for the mothers, while for the Pups same were recorded at the first seventy two hours interval at birth then forty eight hours regularly. The data obtained were subjected to statistical analysis to evaluate the differences in performance among the feed combinations. Group G has the most acceptable combination (15:15:70) while Group I with eight Pups record the height weight (20:40:40) followed by G Five Pups (15:15:70) but Group A (25:50:25) has the highest with nine Pups recording a moderate weights of Pups, therefore by default Group A combination (25:50:25) gave the best combination. Based on the treatment administered and the results obtained, it is advisable to adopt the combination of group A for proper body weight maintenance of the Lactating mothers and young Pups growth performance.

Key Wards: Body Weight, Food, Growth, Mice, Nursing.

INTRODUCTION

The global economic meltdown has necessitated the second thought for alternative ways to alleviate the problems of livelihood particularly the current unpredictable inflations era. The production practice/ farming of an albino Swiss Mice, which is a small mammal characteristically known to have a pointed snout, small rounded ears, a body-

length scaly tail, and a high breeding rate. The best known mouse species is the common house mouse (*Mus musculus*). Its high breeding characters made it to be more profitable to the extent that it can take part in puberty alleviation and due to its remarkable adaptability to almost any environment, the mouse is one of the most successful mammalian genera living on earth today (Behney, 2016). To embark on this practice, then search for low cost, affordable, nutritious and available food from the common local food to feed these animals is also important instead of buying poultry feeds for them, this is all to reduce the cost of management that is to lower the input capital for a profitable business. Wheat, millet and red guinea corn are important common foods used to facilitate the rate of milk production in the breast feeding/ lactating mothers thought relieved their stress and maintain their body weights during lactating period. Wheat is a major cereal crop in many parts of the world. It belongs to the *Triticum* family; it increases milk production. This is in line with theory of Dillah *et al.* (2016) mentioned that the content of legumes can help the process of fetal growth in pregnant women and be able to optimize the expenditure of milk and color sensitivity of breast milk in nursing mothers (Dillah *et al.*, 2016). The knowledge of mammalian biological functions has increased, a new appreciation for studies on the effects of nutritional and animal management on milk production composition has also been gained. Therefore, this research is aimed at finding an appropriate balance diet at cheaper and most affordable price from the common foods used by the community for the breast lactating mothers.

In mammals, milk must provide neonates not only essential nutrients but also a complex repertoire of agents necessary for healthy development. The consumption of milk also supports the growth of infants and accompanies adults throughout their lives. The nutritional value of milk for mammals has led the scientific community to increase the health benefits of milk nutritional qualities in the context of the evolution of farming, ensuring its added value, economic performance for breeders, and animal welfare (Aliyanto and Rosmadewi, 2019).

Milk is secreted by the mammary gland, and the development and function of this organ influence the efficiency of milk production and composition. Understanding the process of mammary gland development is crucial for designing effective levers for improving milk production and composition. Mammary gland development takes place from the fetal stage and then continues during critical periods of life, which are pre-puberty, pregnancy, and

lactation. The cyclicity of mammary function, driven by the reproductive cycle, makes the body weights, mammary gland and organ that entices scientists (Avery *et al.*, 2019).

Milk is composed of significant components, including proteins, lipids, and oligosaccharides mainly lactose, vitamins, nucleic acids, and cells. Milk composition depends on species and offspring needs and sex. Nutrition has considerable effects on Mammary gland development and on milk composition and these effects may be reversible and rapid (Dillah *et al.*, 2016).

It is well known that the diet fed to mammals is an important lever by which body weights, milk yield and milk composition could be modified. Although milk production is affected by numerous dietary nutrients, energy and protein are most critical. Feed grains containing starch such as corn, wheat, barley, and sorghum, as a primary source of energy, are commonly fed to livestock to improve meat/body weights and milk productions. Improving starch utilization may improve lactation performance in mammals and reduce feed costs, especially when grain price is high (Astawan, 2018).

. Whole grain with an intact pericarp is largely or entirely resistant to digestion by ruminants because whole kernels are resistant to bacterial and host enzyme accessing to endosperm of grain kernel in the rumen and in the intestine, respectively (Flacking *et al.*, 2016). Therefore, cereal grains require processing to break the protective seed coat, and the fibrous hull in the case of barley and oats, and to improve grain digestibility. Thus, grain processing can be a useful tool for optimizing lactating mice production by synchronizing energy and protein to improve milk production and maintain their body weights during the stress of breast feeding (Flacking *et al.*, 2016). This study is therefore seeking to compare the nutritional, body maintaining and milk productive effect of Wheat, Yellow guinea and *Sorghum bicolor* corn on lactating mice when combined at different proportions.

Body weight and Breast Milk Production

Breast production is proportional to the body weight which can be increase or decrease depending on the stimulation of the breast glands, as for one of the factors that can affect milk production, among others, the nutritional status of the mother (Maryunani, 2015). One of the causes of breast milk production is not optimal due to the nutritional status of the mother or the mother's nutritional intake that is not good, an unbalanced diet, and also consuming less regular foods causes inadequate milk production to be given to babies. The process of breast

feeding is also influenced by several factors including maternal nutrition, breast care, baby sucking factors, socio-cultural factors, breastfeeding factors and psychological factors (Wahyuni *et al.*, 2017).

One alternative to increase milk production is to consume nutritious foods, one of which is wheat. This is in line with research which shows that mothers who during pregnancy up to the birth process routinely consume nuts, the volume of milk which flows when breastfeeding is twice in thick than the thickness of women who from pregnancy to delivery do not routinely consume nuts. This is in line with theory of Dillah *et al.* (2016) mentioned that the content of legumes can help the process of fetal growth in pregnant women and be able to optimize the expenditure of milk and color sensitivity of breast milk in nursing mothers (Dillah *et al.*, 2016). Wheat is a major cereal crop in many parts of the world. It belongs to the *Triticum* family, of which there are many species; *T. aestivum* and *T. durum* are the most important commercially (Mckeivith, 2014). Wheat is divided into six classes based on different genetic characteristics. Some of these classes are Hard Red Winter, Hard Red Spring, Soft White, Soft Red, Durum and Hard White (Taylor *et al.*, 2015). Wheat is well adapted to various environmental and soil conditions. It is easy to cultivate and is high yielding. Over the past 10 years, the world has produced nearly 576.3 million metric tons of wheat annually from approximately 218.2 million hectares of land. Wheat is used to produce different kind of foods, such as bread, pasta, noodles, pastry, breakfast cereals and baby foods. In order to produce these products, wheat must first be processed into flour. Naturally, wheat is a good source of vitamins such as vitamin E, as well as iron and zinc. Research conducted by Hinde. (2019) shows that (42.5%) of women who have breastfeeding problems are not yet fluent. Before being given the intervention as many as 14 women (35%) complained that the breast milk was a bit smoother. Increased milk production was observed after being given wheat beverage by 35 women (77.5%) with the category of very smooth milk and 5 women (12.5%) smooth milk. Where the results of the study showed a positive effect after the mother consumed wheat beverage regularly during the day. In line with research Tembo. (2018) shows that regular and regular consumption of wheat in nursing mothers can increase milk production. Postpartum mothers were given 250 ml of wheat for 29 days and consumed in the afternoon regularly.

Cereal grains

Cereal grains are rich in starch ranging from 40% in oats up to 80% of dry matter in rice, with the variation in starch content dependent on variety, climatic conditions, and agronomic practices. Starch is synthesized into a form of rough spherical granules and within each feed grain starch granule, multiple concentric semicrystalline and amorphous shells are present (Hurley, 2019).

Feed grain endosperm encapsulate by protein matrix acts as a physical barrier to protect from enzymatic hydrolysis. It has been shown that this protein matrix by blocking the absorption sites or by influencing enzyme binding may reduce the surface availability of starch to host enzyme and ruminal bacteria. In addition, the results of several studies have shown that hydrophobic properties of grain protein matrix, associated with type and location of proteins, could be responsible for the differences in starch digestion between rapidly digested grains such as wheat, barley, and rice, and slowly digested grains such as maize and *sorghum* (Hurley, 2019).

Relations of lactation to body weight and age

Lactation performance of a mouse is correlated with her weight even when this is measured as early as 12 days of age. The correlation is no more pronounced when the measurement of weight is delayed until mating, i.e. only shortly before lactation. Evidence is given that different mechanisms are responsible for the correlations with earlier and with later weights. The earlier correlations demonstrate the inheritance of lactation performance from mother to daughter and the effect of the mother's lactation on her daughter's weight. This maternal effect on body weight diminishes in older mice, but inherent determination of weight increases. Thus the correlation of lactation with later weights arises from pleiotropy of gene action, and perhaps receives a contribution from effects of the environment that the two 'characters' have in common. Lactation performance is also correlated with age, but only through the greater weight of older mice. Age seems to have no independent effect on lactation, e.g. on the development or efficiency of the mammary glands (Phipps, 2015).

MATERIALS AND METHODS

Collection and Identification of the Food grains

The Wheat, Yellow guinea and Sorghum bicolor corn were obtained from Sabon Gari market Zaria and taken to the department of botany for proper identification by an Agronomist Dr Shu'aibu Ahmad Muhammad of Department of Agriculture School of vocational Sciences, Nuhu Bamalli Polytechnic Zaria.

Preparation of the Feed

The Wheat, Yellow guinea and *Sorghum bicolor* corn obtained were separately washed and dried at room temperature, after that each one were pounded into powder using mortar and pestle. They were being measured to suit a required proportion combinations needed at different ratios to make 100% respectively thus; (25:50:25, 50:25:25, 70:15:15, 60:20:20, 30:40:30, 15:70:15, 15:15:70, 35:35:30, 20:40:40 and 33:33:33), these combinations were used to feed the experimental animals for two (2) weeks acclimatization and eight (8) weeks research period (from gestation to wining period)

Feeding Process

Each cage had its specific ration formula which were 25:50:25, 50:25:25, 70:15:15, 60:20:20, 30:40:30, 15:70:15, 15:15:70, 35:35:30, 20:40:40 and 33:33:33 respectively given to each pair of mice/cage (A-I).

The initial weights of the animals were taken and recorded before given food after which the animals were fed and the next weight were taken and subtracted from the initial weight to obtain the weights difference. Food remaining were being weighed and subtracted from the weight of the previous food administered; these were also being subtracted from the initial food weight to get the value of the food intake.

Effects of the rations in body weight maintenance and milk product on lactating mice

The effect of the food was checked from the records obtained through the increase in size and weight of the lactating mother and comparism will be made between the weight before conception and the one after weaning time.

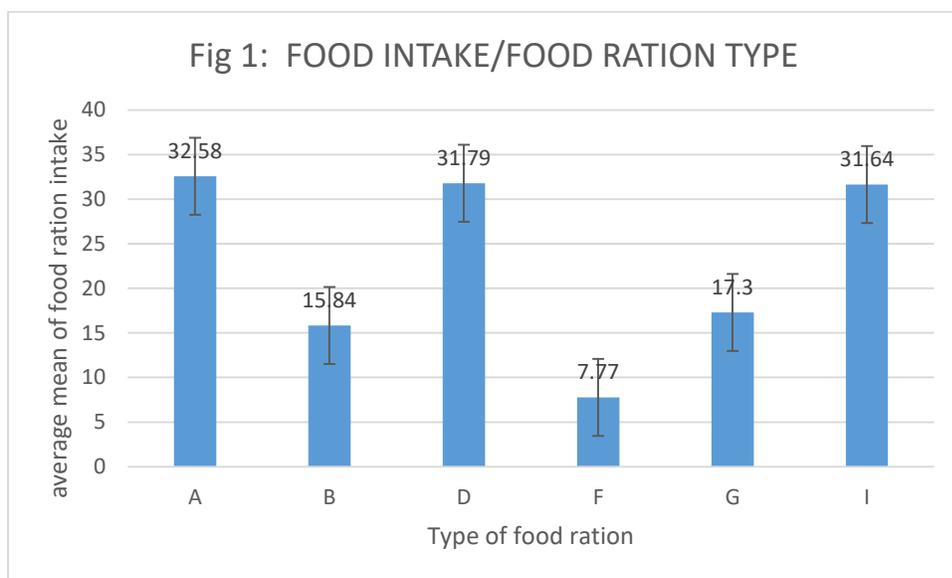
Babies (Pups) size and weights

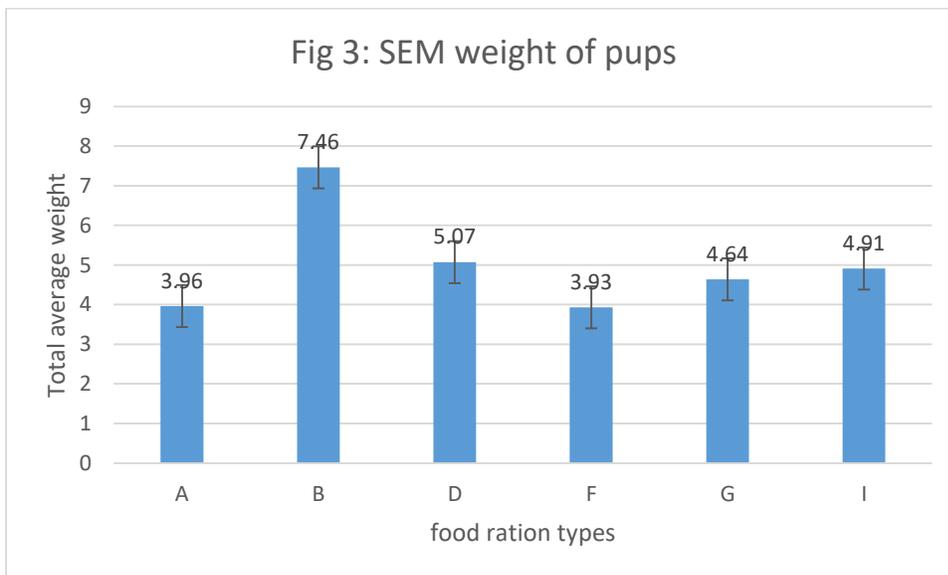
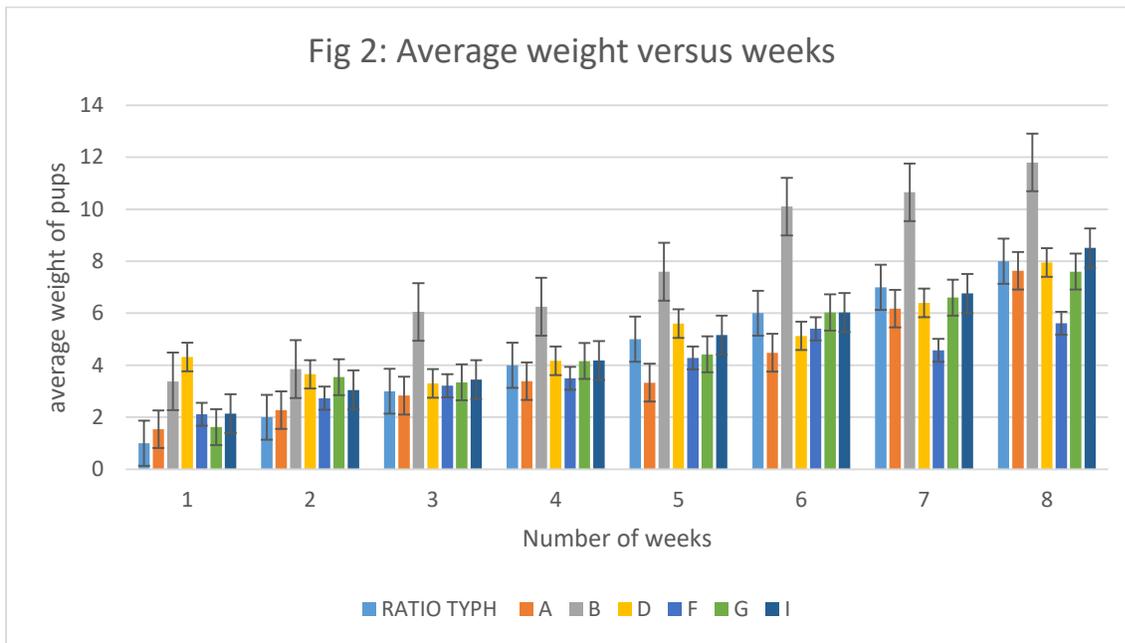
The milk availability for the babies were determined by their sizes (rate of growth) and weights; as such a periodical interval were set for their weighing and the results were being recorded.

Ration formulation for each Experimental Cage

Cage	Wheat	Yellow guinea corn	Sorghum bicolor	Total
A	25	50	25	100
B	50	25	25	100
C	70	10	15	100
D	60	20	20	100
E	30	40	30	100
F	15	70	15	100
G	15	15	70	100
H	35	35	30	100
I	20	40	40	100
Control	33	34	33	100

RESULTS AND DISCUSSION





Discussion

One of the factors that influences growth performance and productivity is mother's nutrition. The nutritional needs of breastfeeding mothers increase during breastfeeding to support the growth and development of infants, especially for the lactation process (Aba *et al.*, 2014).

This study used Wheat, Yellow guinea corn and *Sorghum bicolor* to determine their effects on maintaining the body weight of the lactating mothers and the growth performance of albino mice pups; it was observed by weighing the progressive increase of weight and the feed intake ration for each lactating mother respectively; it was found that there was variation in the weight and feed intake for each mother as per the ration. Fig. 1 shows the order of food intake rate against the food ration types is in the following order A>D>I>G>B>F this may be due to the nature of the proportional of the ration and the palatability which leads to their acceptability, the more palatable of the food the higher it become consumed (Phipps, 2015). Fig 2 shows the average weights of the pups against the duration period of the weeks which revealed a progressive increase. But in fig. 3: the mean average weights of pups fed with ration assumed This progressive order: B>D>I>G>A>F. The cage B pups weighed most, despite being highest in number (9), and by what figure 1 read, it is the least in food intake, invariably it indicate that the food combination of ration B have the proper balance formulation than any other formulation. This may be as a result of moderate percentage of wheat as reported from research conducted by Hinde. (2019). Therefore, conclusively this study have found that, the best food ration that can maintain the body weight of the lactating mother and reflect on the growth of the young pups mice is 50:25:25.

Conclusion

This study was carried out to determine the nutritional effects of wheat, millet and *Sorghum bicolor* corn on the growth performance of albino mice pups, based on the findings it shows that the combination of wheat, millet and *Sorghum bicolor* corn at ratio 50:25:25 had high nutritional contents as it helped in enhancing the milk production effect, weight maintenance, feed intake and offspring growth. It can therefore be concluded that the combination of wheat, millet and *Sorghum bicolor* corn possess nutritional effects which enhances the body weight maintenance of lactating mice and growth of their pups.

Recommendations

Based on the findings of this study:

- i. That the breast feeding mothers should be given the combination of this food for higher growth performance for both the mother and baby.
- ii. It is highly recommended that weaning baby food producing industries should incorporate commercial weaning food with wheat, Yellow Guinea corn and *Sorghum bicolor* corn flour.
- iii. Mothers and care givers should be properly educated on how to prepare such formula or blends. This is because average family can hardly afford most of the company processed weaning foods due to their exorbitant prices.

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