ENERGY METABOLISM IN THE Duck

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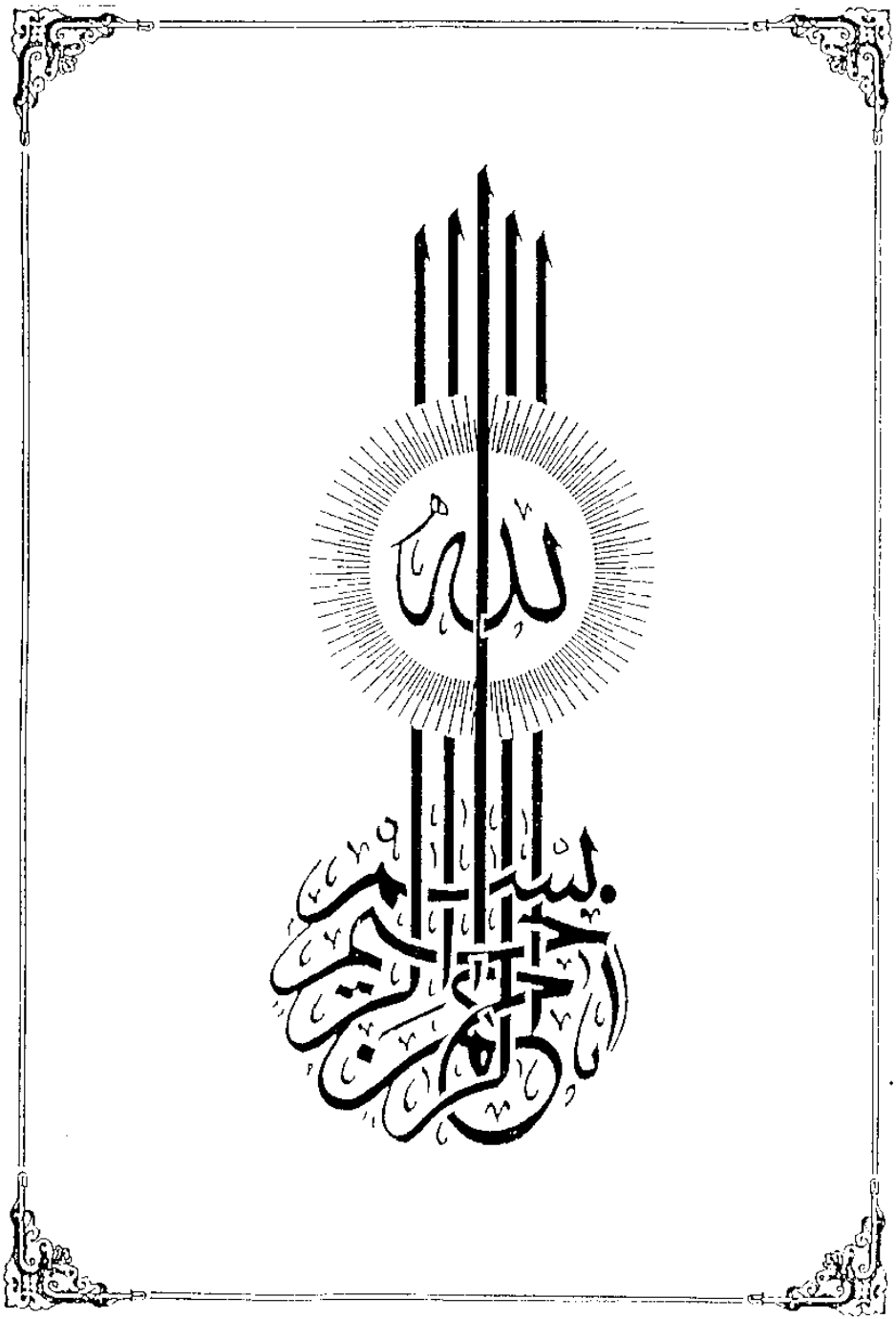

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INTRODUCTION

In common practice the formulation of duck rations is usually done using the calorie protein ratio maintained between total protein and kcalories of metabolizable energy of the ingredients used.

Unfortunately, however, the metabolizable energy values used for such ingredients are measured with chicks as experimental animals.

The tendency of ducks to deposit fat in their carcasses is widely observed and aside of genetical factors this could be achieved by better energy utilization of the energy content of the rations fed. Tackling such problem should include the probability that the metabolizable energy values obtained with chicks are rather high for ducks and that such values should be redetermined using the duck as the experimental animal.

In order to investigate the differences between ducks and chicks as energy consumers, simultaneous comparison was made between the ME values obtained for some feed-stuffs with two species.

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The present study was therefore undertaken to :-

I Measure directly with Pekin ducks the classical metabolizable energy (ME) of some ingredients namely : corn, wheat, barley, cotton seed meal, field beans, wheat bran and fish meal.

II Formulate practical rations for Pekin ducks with the new ME values.

III Test these values of ME with different kind of ducks (Muscovy). This investigation included quantity of excreta, energy losses, apparent ME and true ME. The ability of chicks (broiler) and ducks (muscovy) to metabolize high fibre diets was also measured.

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REVIEW OF LITERATURE

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REVIEW OF LITERATURE

A- Evaluation of Classical Metabolizable Energy

Many authors have reviewed the subject of energy concepts for poultry nutrition (Titus, 1961 ; Lockhart et al ., 1963 a ; Vohra, 1966 ; Kurnick, 1967 and Kohler & Kuzmicky , 1970) . Currently, metabolizable energy values (ME) are popular for the use in computing the least cost diet formulations (Vohra, 1972) .

No doubt , ME is easier to determine and more practical than net energy or Frap's (1944) productive energy . The partition of gross energy (GE) into its various pathways is given in Fig. 1 . By its very concept, ME is the energy available for anabolism (the building of body substance, egg) and for catabolism (the heat production of animals) Kleiber, (1961) Thus :-

$$ME = GE_i - GE_{ex}$$

where GE_i = gross energy of the dietary intake

GE_{ex} = gross energy of the equivalent excreta.

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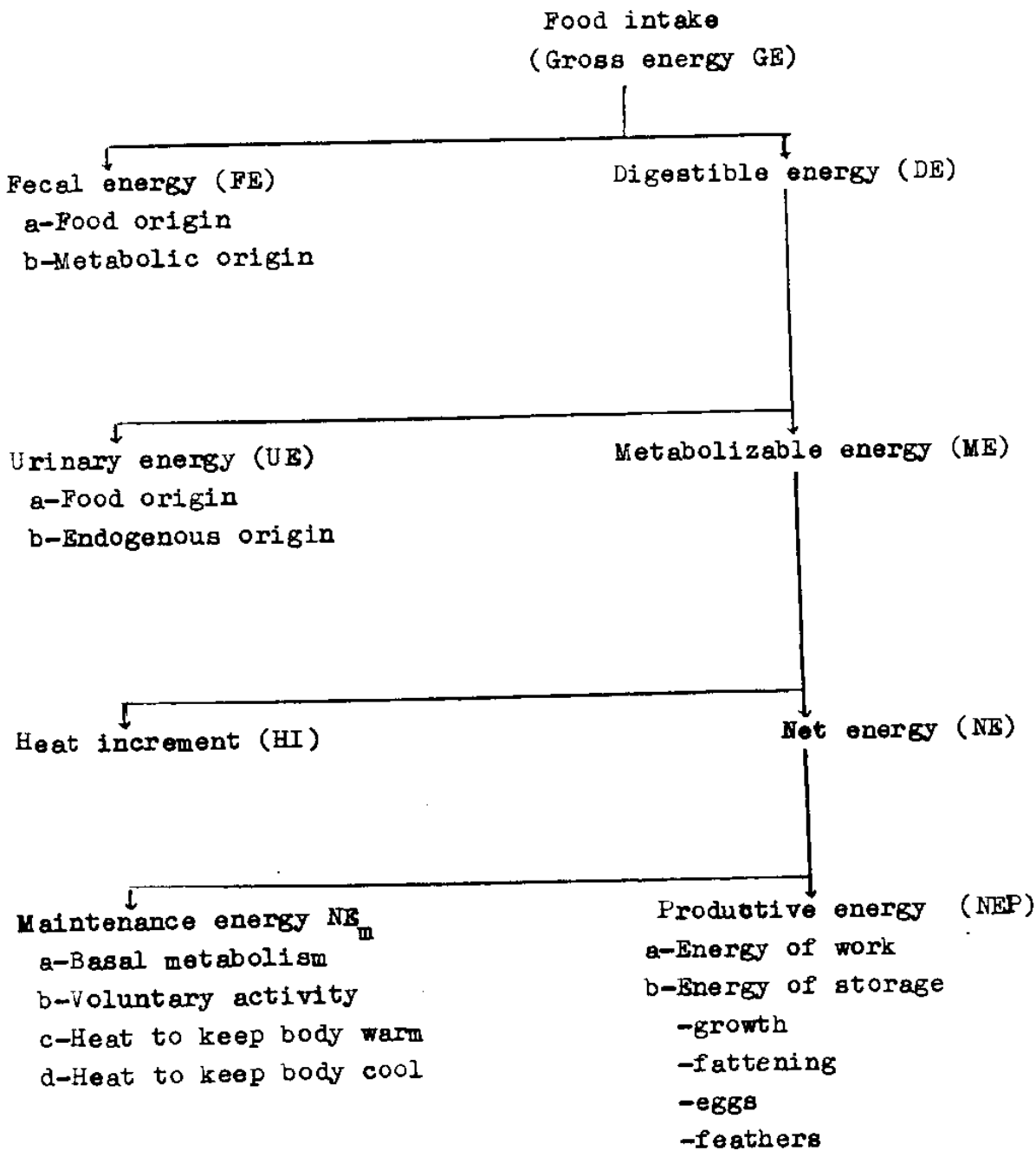
Fig.1 : The partition of gross energy of foods



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If the ME values is corrected for nitrogen balance, then it should be termed as ME_n (NRC, 1966) . The term nitrogen balance (NB) is measured by subtracting the nitrogen in excreta (N_{ex}) from nitrogen in feed intake (N_i) .

$$ME_n = ME - NB$$
$$= GE_i - GE_{ex} - (N_i - N_{ex})$$

Metabolizable energy is affected by several factors such as experimental animals, diets, environment or to the methods used. (Sibbald et al 1960 ; Renner & Hill 1961; and Häkansson, 1974). Besides, all the factors affecting the digestibility of principle nutrient of diet may, indirectly, influence ME (Baldini, 1961).

Sibbald et al (1960) demonstrated that the ME value of a foodstuff increases as the chick becomes older. Accordingly hens showed higher ME values than chicks for autoclaved extracted soyabean flakes (Hill & Renner, 1963) , for rapeseed meal and soya bean meal (Sell,1966 ; Lodhi et al , 1969and Rao & Clandinin, 1970), for corn, barley hulls, wheat bran, dehydrated alfalfa meal and saflower meal (Peterson et al., 1973); and for corn gluten feed (Hochstetler & Scott, 1975).

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However, there are still unsolved problems associated with ME determination concerning differences sometimes detected between species (Slinger et al. , 1964 ; Fisher & Shanon, 1973 ; Lesson et al., 1974 and Sugden, 1974) , between strains (Sibbald & Slinger, 1963 b ; Slinger et al ., 1964 ; Bayley et al ., 1968 ; Foster, 1968 a ; Proudman et al ., 1970 and March & Biely, 1971) and between experimental animals of different ages (Renner & Hill, 1960 ; Lockhart et al , 1963 a,b ; Zelenka 1968 ; Lodhi et al ., 1970 and Rao & Clandinin, 1970).

Sibbald and Slinger (1963 b), stated that ME values of feeds were higher for White Leghorn chicks than for White Rock chicks, and the same authors (1963 b) showed that the ME values obtained with turkey for a diet of low energy content were hiegher than those obtained with the chicks, while the inverse was true for a diet of high energy content. Bayley, et al ., (1968) extended these findings and showed that the ME valus of raw wheat germ meal with adult large white male turkey was higher than that obtained with chicks or adult cockerels. These authors also showed that these differences did not occur

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