

Dietary factors are affecting on endogenous amino acid losses (EAAL) in broiler chickens - A Review

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Abstract: Feed and diet formulation directly influence on endogenous amino acid flow and its losses in poultry. The dietary ingredients are increase total flow of endogenous secretions in birds, then the internal secretions decreases amino acid digestibility. There are various factors affecting on endogenous amino acid losses (EAAL) in broiler chickens directly, but especially in dietary supplementation the protein sources highly affects on total endogenous amino acid flow. Feed ingredients containing protein sources with various concentrations of amino acids (AA), dietary fibers, Phytate Phytic and marker which use for as indicator are may increase and decrease the endogenous secretion. Intestinal physiology including mucin formation is responsible for maintaining internal secretion to control endogenous amino acids flow and its production. The intestinal gut performance directly proportional to the total flow of EAA in distal of ileum. The age of bird with different dietary supplementation of feed ingredients are also effects on total endogenous amino acid flow. This review explain briefly all dietary factors are affecting on EAAL in broiler chickens, and the evaluation of apparent, true and standardized digestibilities. The measurement and accurate estimation of endogenous secretions in mono gastric animals are still finding with various methods and techniques, but it cannot deny that the factors are directly and indirectly affecting on endogenous secretion. It desires to identify all factors which are influencing on EAAL in poultry.

Keywords: Dietary supplementation, factors, endogenous amino acid losses, broiler chickens

INTRODUCTION:

Birds feed formulation and ingredients with various ratios and there digestibility effects on endogenous amino acid losses (EAAL). Dietary supplementation of feed stuffs some time directly and indirectly influenced on endogenous origin amino acids. Amino acids of endogenous origin can originate from sources such as digestive secretions saliva, bile, gastric, and pancreatic secretions as well as intestinal secretions, mucoproteins, sloughed intestinal epithelial cells, serum albumin, and amides [1,2], with the amino acids representing various % of TAA flow in the broiler fed an NFD [3]. Endogenous amino acid losses can be divided into two major fractions [4]. The first portion is the basal endogenous flow representing the amino acids that are lost irrespective of whether the animal is fed. This remains constant and is not affected by dietary amino acid level. The second portion is specific fraction arises as a result of the diet that is within the gastrointestinal tract (GIT) and the nature of the diet can influence the quantity of amino acids that are secreted into the GIT. Ileal amino acid digestibility coefficients that have been corrected for both basal and specific

EAA have been determined using the regression method [5]. Because this method requires feeding graded levels of the test ingredient, it invariably corrects not only the basal but also the ingredient specific EAA losses. When apparent ileal amino acid digestibility values for soybean meal [6], were corrected for EAA losses by applying basal EAA losses by [7] and compared with values generated by the regression method [8], the difference in SAAD digestibility ranged between % units. The lowest and highest percentage unit differences were for cysteine and aspartic acid, respectively. The costs of the linear regression method may make the single semi purified diet and correction for basal EAA losses a preferred approach. Whereas the regression method as described by [9] results in a digestibility coefficient that is closer to “true” values, using the single semi purified diet (NFD) corrects only for basal EAA flow and therefore represents “standardized” values. Both methods, however, presume additively when formulating a complete ration. The level of EAA flow depends on the presence of anti nutritive factors nature of dietary fiber and level of amino acid or protein intake [10]. The separation of

EAA from amino acids of dietary origin has been made possible with the development of the isotope dilution method [11]. Basal losses have been measured using different techniques and the results are often inconsistent. The reasons for this may include the presence or lack of amino acids in the diet, the level of amino acid intake, the age of birds, or the species and strain of poultry. In addition to these potential sources of variability, it is still important to evaluate techniques that might be used to increase the reliability of data that are generated. The importance of determining EAA flow is that these values can be used to standardize digestibility coefficients of feed ingredients that can ultimately be used to formulate diets based on a digestible amino acid basis. Mucin is a polymeric glycoprotein that comprises the main component of the mucus layer that covers the entire epithelium of the GIT [12, 13]. Because mucin is constantly secreted and renewed and a high proportion of mucin remains undigested in the distal portion of the small intestine [14, 15], ileal digestibility values (apparent) of some amino acids are compromised. The high concentration of threonine in ileal digesta has been attributed to the contribution of mucin to the ileal digesta and this may contribute to the low ileal apparent digestibility coefficients for threonine in many feedstuffs [16]. This is supported by data from our laboratory [17] and [18] reviewed in details the potential dietary effects on mucin. In chickens, however, glutamic acid, aspartic acid, serine, and threonine were the prominent amino acids [19, 20]. Across species (rats, pigs, and poultry), type of poultry (broilers, roosters, and laying hens), and methodology [NFD, HDP, enzyme hydrolyzed casein (EHC), and guanidination methods], the predominant EAA found in the ileal digest are glutamic acid, aspartic acid, threonine, serine, glycine, leucine, and proline [21, 22]. These findings suggest that neither the method of estimating EAA flow nor the concentration of dietary amino acid influence the order of predominant amino acids of endogenous origin rather the concentration of EAA in the digesta. Therefore, the relative contribution of amino acids of endogenous origin from different sources is influenced by the diet. Furthermore, these amino acids are high in the endogenous secretions of germ free chicks [23, 24]. The present review criticizes and discuss on dietary feed ingredients supplementation and dietary factors which are highly affecting on birds. The various ratios and choice of stuffs not only influence on EAAL but represent to increase its flow and production in poultry.

DIETARY FACTORS ARE AFFECTING ON (EAAL) IN BROILER CHICKENS

Feed ingredients

The diet and its selected ingredients directly affects on endogenous secretions, maybe some time it's lower and higher in birds. It was reported in numerous time that dietary feed stuffs not increased EAAL but its help in production and total flow of endogenous secretions [25]. The offered feed stuffs in poultry its

desire to evaluate on choice and digestibility in birds. The utilization and absorption of supplemented diet can be help to estimate accurate endogenous losses [26]. Protein sources are widely used in poultry diets, but it cannot determined that which sources is absolutely digest and cannot high endogenous secretions. In Table 1& 2, it's clearly show that dietary ingredients basal, specific and total losses in birds. The published data clarify that different protein sources and its percentage of utilization.

Protein sources

The protein and various protein sources used in poultry feed formulation for better production and fulfill the requirement of birds. These sources some time directly and indirectly influenced on EAAL in birds, the results decreases digestibility of ingredients [27]. The numerous studies were documented that the different protein sources in Table 2, including casein, gelatin, soy protein, soybean meal, rapeseed meal, sunflower meal, field peas, fish meal, meat and bone meal, maize, sorghum, and wheat are widely used in poultry feed. These protein sources were analyzed basal, specific and total losses in EAAL. Moreover the digested and undigested feed ingredients directly effects on total flow of endogenous secretions in birds. Its need to modify the different protein sources in poultry feed formulation and selection for better production. If the selected ingredients reduce the endogenous losses, on other side these are enhance the growth and performance. It was reported that dietary digestible feed ingredient reduced the EAAL and increased the performance in mono gastric animals [28].

Dietary Amino Acid (AA)

Dietary concentration of amino acids is another factor that may influence EAA losses via increased digestive enzyme secretion and mucin dynamics in the gut of non-ruminant animals. In the work of [29], pre-ruminant calves were fed milk substitutes with CP ranging from 140 to 278 g/kg and mucin flow at the duodenum significantly increased with increasing dietary CP. One likely explanation is increased mucus hydrolysis leading to increased mucin concentration in the digesta. Additionally, the increase in EAA losses could be attributed to the increased secretion of digestive enzymes in response to increased protein and peptides in the gut. This may be responsible for the high EAA flow observed with increasing level of intact casein as reported by [30] EHC or guanidinated casein [31] compared with when NFD was fed. Furthermore, it has been reported that the addition of plant protein to milk substitutes increases mucin flow in calves [32].

Dietary Fiber

Dietary fiber is one of the feed fractions that have the ability to affect mucin dynamics, including mucin excretion, in the GIT of animals. A combination of increased fiber wheat bran added to an NFD and high DM intake resulted in significant increase in mucin

output in the digesta [33]. It was also [34] reported an increase in EAA flow in pigs fed NFD with increased dietary fiber, moreover it was concluded [35] that a high fiber cellulose concentration in the diet of broiler chickens increases the EAA loss, but the composition of the EAA fraction was not affected. Solubility of the fiber as well as the water holding capacity of the diet, especially the capacity of dietary fiber to absorb water, is important to overall EAA flow [36]. Additionally, dietary fiber can affect mucin composition. The role of short-chain fatty acids formed in the large intestine via fermentation can also influence mucin dynamics [37]. Hence, the level and nature of dietary fiber may explain some of the increases in the EAA flow in non ruminant animals [38] as well as inconsistencies in EAA flow observed in different studies. Studies using adult cockerels fed an NFD containing potato starch pectin resulted in increased EAA secretions compared with birds fed NFD with insoluble fiber [39]. Dietary fiber fed to rats also increased endogenous secretions, presumably because of the abrasive action of the fiber on the mucosal surface of the gut [40]. It appears that the presence of anti nutritive factors in poultry diets will reduce amino acid digestibility and increase EAA secretions [41]. Tannins, lectins, and protease inhibitors have also been shown to increase EAA production [42]. The presence of anti nutritive factors in the diet stimulates digestive enzymes secretion into the gut, increases sloughing of epithelial cells, and increases mucin production, resulting in reduced apparent amino acid digestibility [43].

Plan feed stuffs secrete phytate phytic

The phytate phytic is a naturally occurring phyto-chemical, is found in almost all plant feedstuffs [44]. The ability of phytate to form complexes with proteins and other nutrients is thought to be a mechanism through which phytates exert anti nutritional effects. Phytate can also inhibit the activity of trypsin by binding with calcium and inhibiting the conversion of trypsinogen to trypsin [45]. It was reported [46] that phytic acid increases mucin and EAA losses from the GIT of chickens and that the extent of the loss is a function of the type of phytate in the diet. The likelihood of negative effects of phytate on protein utilization was suggested by [47], whereas [48] proposed a mechanism by which this might occur. The negative effects of phytate on protein digestibility could be attributed to the de novo formation of protein phytate complex in the GIT [49]. These complexes have been reported to be resistant to pepsin activity [50]. Furthermore, [52] and [52] proposed that the decreased apparent amino acid digestibility values observed in grains and cereals may be a result of phytate induced increases in EAA flow. It was reported in broilers that phytates significantly increased TAA excretion by about 28% whereas the addition of phytase reduced this increase in EAA loss by about 20% [53]. The increased EAA flow was attributed to increased secretion of

mucoproteins as a result of phytate stimulation of the GIT [54].

Diet Marker

The variability that has been reported in some digestibility studies as well as in estimating EAA losses could be attributed to the type of index marker included in the diet. Although the marker itself likely has no bearing on EAA flow, passage of the marker, segregation, and analytical variation of different markers may contribute to differences between published values. The magnitude of the variations in amino acid digestibility may be associated with the type of index marker used as reported in the met analysis by [55], with titanium oxide and acid insoluble ash showing a larger increase in amino acid digestibility with the addition of phytase in the diets when compared with diets containing chromic oxide as the inert marker. It was reported [56] challenged the validity of the assumption that chromic oxide is uniformly distributed in the transit rate of digesta and the marker is uniform. This observation, however, must be subjected to further empirical test, especially with all the markers being tested in the same study and across similar ages.

Intestinal physiology

The intestinal normal functions are maintaining the total flow of endogenous secretions and its production. There are various numbers of microbial populations which are directly effects on endogenous secretion [57]. The intestinal microflora some time increase and some time decrease the endogenous secretions, these internal secretions are effects on EAAL in birds. The dietary supplemented ingredients and offered diets influence on intestinal populations. It was reported that the bacterial growth effects on total flow on endogenous secretions [58]. If the intestinal physiology and performance is normal then it cannot influence on EAAL. Moreover in poultry the intestinal performance is better than other mono gastric animals, because of their life keeping period. The broiler period is very short; therefore in birds the intestinal performance cannot affects on EAAL. The intestinal activity is desire to evaluate the endogenous secretions and total flow of endogenous amino acids.

Mucin Secretions

A considerable amount of mucin is digested in the hind gut [59] despite the fact that mucins are mostly mucoproteins that are protected from further proteolysis in the small intestine by a coat of oligosaccharides [60]. It was reported [61] that mucin protein content increased distally along the small intestine of the chicken and intestinal mucin is continually degraded and renewed [62]. Because of the dynamic nature of mucin degradation and synthesis, the turnover rate is not regular; therefore the thickness of the mucus layer may vary depending on the balance between synthesis and degradation. This balance can be influenced by the nature of the diet or presence or virulence status of

pathogens [63]. The concentration of amino acids in the diets may also influence this balance. Throughout the small intestine in chicks the mucus layer is similar in thickness [64], whereas in the rat the layer is similar in the duodenum and jejunum and thicker in the ileum [65]. When 4 week old broiler chicks were deprived of feed and water for 72 h, the intestinal surface area was reduced along with a thinner mucus adherent layer [66]. Similar observations were observed in laying hens starved for 36 h [67]. This suggests that the presence of feed in the GIT is important for the continual synthesis and secretion of mucus. The most obvious effect of starvation in 28 days old broiler chicks was the enlargement of the goblet cells in the small intestine, in addition to decreased mucin thickness and increase in mucin protein concentration [68]. The increase in goblet cell size may be an indication that the GIT sensed the need to increase mucin production. The role of feed withdrawal in intestinal physiology and mucus secretion was reported by [69]. They reported a 46% decrease in mucus from 0 to 24 h of feed withdrawal. This observation underscores the importance of DM intake or changes in nutrient status of the bird on intestinal mucin turnover and gut integrity. The problem with determining EAA contribution from mucin and thus the aforementioned issues related to level of differences across the literature are likely attributable to methodologies used with the bioassay itself. Notably, several physiological factors influence the level and degradation rate of mucins.

Gastro intestinal tract (GIT) Microflora

The GIT health status of the bird is yet another important factor that may contribute to EAA loss. Because most of the studies that have looked at EAA losses in poultry have been conducted using birds in cages, the birds are removed from exposure to potential bacteria and pathogens, which might influence gut health. Although it has not been directly determined, raising birds on litter could lead to an increase in bacterial challenge to the gut and potentially disrupting the intestinal mucus layer and increasing gut turnover, secretion, and passage rate. Regarding intestinal turnover, presence of intestinal microflora increases turnover rates of the duodenum [70] and ileum [71] respectively. When pathogens are present, however, this turnover can increase quite dramatically and thus influence the endogenous amino acid flow. For example, [72] similarly, additional environmental pressure due to bacterial load can influence other aspects of endogenous amino acid losses through mucin production. For example, birds that are exposed to increased bacteria load in the environment have higher requirements for threonine [73]. Because the mucin layer contains a diverse array of carbohydrate components, they contain a wealth of potential attachment sites for pathogenic bacteria [74]. Mucin production is largely a balance of production, secretion, degradation, and sloughing. Notably, some pathogens secrete proteases and glycosidase to utilize mucin as a

nutrient source. Some pathogens will produce virulence factors that can increase mucin degradation whereas others can produce toxins that increase mucin production and secretion [75]. In broilers, a causative link has been noted by [76] where in *Clostridium perfringens* actively induces mucin production and active mucolysis aiding in rapid proliferation, resulting in necrotic enteritis. The extent to which different environmental and bacterial stressors affect EAA flow, however, has largely not been quantified.

Bird's age

The effect of age on ileal EAA estimates has been reported for poultry [77] and swine [78]. In broiler chicks and turkey poults, [79] reported that ileal EAA (mg/kg of DM intake) flow in 5 day old broiler chicks was approximately twice that observed on d 15 or 21 whereas the difference in flow during the same period in turkey poults was about 3-fold higher than that of broiler chicks. These results point to 2 things. First, under a given set of conditions, the concentration of amino acids of endogenous origin in the ileal digesta on d 5 could influence the apparent digestibility values of various ingredients. This brings into question the extent to which amino acid digestibility of feed ingredients increases after the first week of age. Additionally, the drastic reduction in ileal EAA flow on d 15 relative to d 5 as well as the lack of significant difference in ileal EAA flow between d 15 and 21 is interesting. It was reported [80,] attributed differences in endogenous EAA flow observed in pigs to differences in the efficiency of endogenous N & EAA reabsorption rather than to differences in the rate of protein synthesis in the gut. This means that correction for EAA loss during the first week may be crucial in reducing N excretion in poultry. This age effect is similar to that recently reported in broiler and turkey poults [81]. The effect of increasing the concentration of peptides or protein in the test diet also resulted in an increased EAA flow at the terminal ileum of birds [82] and pigs [83]. In young poultry chicks and poults, increasing the concentration of dietary casein (0, 5, 10, or 15%) resulted in a linear increase in EAA flow. The respective increases for TAA flow were 42, 49, or 59% (on day of 5) and 40, 55, or 72% (on day of 21) when compared with birds fed an NFD [84]. It was documented [85] that the presence of dietary protein 19% CP from EHC diet and 19% CP from guanidinated casein diet resulted in 42% EHC and 63% guanidinated casein increase in N flow. For all of the amino acids, N, and CP, no difference in EAA flow was found between the EHC and guanidinated method; however, flow from birds fed these diets was higher than that of birds fed the NFD.

In the studies reported by [86], basal EAA flow was also estimated by regressing ileal EAA flow against dietary casein concentration. The results showed that on d 5, basal ileal EAA flow obtained from the regression method was higher chicks or lower poults than flow from the NFD method for most of the amino

acids whereas on d 21 chicks and poults no difference was found between the 2 methods. It is important to note that the concentration of dietary protein and amino acid, especially the minimum concentration fed, may have some effect on basal EAA flow estimation using the regression method. It is important to determine how significant such an effect could be in a single study. Amino acids of dietary origin elicited a response in EAA flow in pigs that was similar to that observed in poultry. Ileal EAA flow from 100-kg pigs fed a semi purified diet containing 16.71% intact casein was higher for most amino acids than from pigs fed an NFD [87]. The results from the study by [88] in 179-g rats and 19.2kg pigs showed that the guanidination and the isotope (¹⁵N) dilution methods gave a lower estimate of ileal EAA and ileal endogenous N flow [81,89], respectively, than the EHC method in both species. Also, the ¹⁵N infusion method gave a higher estimate of endogenous N flow than the EHC method in the pig [81, 82]. The large difference in EAA observed between NFD and semi purified diets containing intact casein, EHC, or guanidinated casein could be the result of 2 factors. One, the proportion of casein that was not completely digested or absorbed may have increased with increasing concentration of dietary protein. The undigested and unabsorbed protein of dietary origin has to be significant to justify the large difference observed. The alternative explanation is that an increasing intake of dietary protein resulted in an increase in endogenous protein secretion into the gut [90, 91].

EVALUATION OF ILEAL ENDOGENOUS AMINO ACID (IEAA) FLOW

Apparent ileal amino acid digestibility

The apparent ileal amino acid digestibility is taken word 'apparent' is mean to reflect that both non-digested dietary amino acid and ileal endogenous amino acid losses throw in to the total ileal outflow. Following equation measured (AID):

$$\text{AID (\%)} = [(\text{AA intake} - \text{ileal AA outflow}) / \text{AA intake}] \times 100$$

Principles of apparent ileal digestibility represent the net disappearance of amino acid from the digestive tract earlier to the distal ileum. The major concern with the use of apparent ileal digestibility is that values for apparent ileal digestibility of individual feed ingredients obtained which always not additive in mixed diets [92]. It shows a major problem in practical diet formulation, because addition of values for individual feed ingredients is necessary for accurate predictions of growth performance and production in poultry production systems. The additives, medicine, growth promoters and supplements are affected on apparent ileal digestibility of broilers [93]. Lack of stability is the main reason for this non-linear relationship between dietary amino acid levels and observed apparent ileal digestibility, when unreliable the addition of a test feed ingredient in an N-free basal

diet [94]. But its need consistency in methods for further improvements and find out drawbacks of methods.

True ileal amino acid digestibility

The true ileal digestibility represents the quantity of dietary amino acid that disappears from the digestive tract earlier to the distal ileum, and it does not include ileal endogenous amino acid losses, following equation measured (TID): $\text{TID (\%)} = [(\text{AA intake} - (\text{ileal AA outflow} - \text{total IAA}_{\text{end}})) / \text{AA intake}] \times 100$

The main difficulty of exactly measuring total ileal endogenous amino acid losses, true ileal amino acid values for feed ingredients are not often available. The total ileal endogenous amino acid losses are subtract from the ileal outflow, the importance of true ileal digestibility do not differentiate between feed ingredients that make different levels of specific ileal endogenous amino acid losses. Therefore, the values of true ileal digestibility do not expect the amount of amino acid that are available for protein synthesis in animal, the importance of true ileal digestibility should not be used in practical diet formulation, except diet effects on specific (IEAAL) ileal endogenous amino acid losses, these are considered as a important part of animal amino acid requirements.

Standardized ileal amino acid digestibility

Standardized ileal amino acid digestibility is calculated as the values of apparent ileal digestibility except the basal ileal endogenous amino acid losses is subtracted from the ileal outflow, following equation measured (SID):

$$\text{SID (\%)} = [(\text{AA intake} - (\text{ileal AA outflow} - \text{basal IAA}_{\text{end}})) / \text{AA intake}] \times 100$$

The specific components to the feed ingredient are included in the calculation, thus, values for standardized ileal digestibility distinguish between feed ingredients inducing different levels of specific ileal endogenous amino acid losses (IEAAL). The standardized ileal digestibility (SID) values are additive in mixed diets [95]. Thus the disadvantages of apparent ileal digestibility and true ileal digestibility (lack of additively and clarity represent specific ileal endogenous amino acid losses) are overcome if values for standardized ileal digestibility are used in diet formulation. It should be noted, that the values for standardized ileal digestibility are influenced by the estimate of basal ileal endogenous amino acid losses, and also the level of feed intake. The significance, values of basal ileal endogenous amino acid losses and standardized ileal digestibility should be measured in the same environment that animal fed closely to like freely fed diet. When using standardized ileal digestibility values in feed formulation, in the diet the basal endogenous losses considered as a part of the animal's amino acid requirement.

Endogenous Losses

The measurement of endogenous energy loss (EEL) and endogenous amino acid loss (EAAL) is a prerequisite for the determination of true metabolizable energy (TME) and true available amino acids (TAAA), respectively. It has to be admitted that there are both difficulties and uncertainties in the determination of these components in the excreta. Any errors which cannot be taken into account will result in errors in the values ascribed to the apparent metabolizable energy (AME), TME, apparent available amino acid (AAAA) and TAAA values. Three methods have been used to derive endogenous excretions: starving birds, feeding birds a completely metabolizable energy source (for example, glucose) or by extrapolating to zero intakes. Starvation has been the most widely used method for estimating endogenous excretions [96]. Neither bird weight nor body weight changes appeared to explain a significant proportion of the variation in endogenous

excretions [97]. However, [98] have reported an interaction between temperature, endogenous energy and TME values. Age and strain of the bird but not its sex have been shown to affect endogenous energy excretion in starved birds [99]. These effects were tentatively attributed to differences in body composition and basal metabolic rate [100]. Endogenous amino acid flow to the ileum in fasted cockerels was significantly lower than that obtained both by feeding a nitrogen free diet NFD, and from regression analysis in either broilers or cockerels [101]. Another factor which must be considered is the influence of age or live weight on endogenous secretions. In the case of endogenous energy secretion, some differences have been attributed to differences in live weight [102]. It was reported that [103, 104] that precision feeding a diet had no influence on the quantities of endogenous amino acids or endogenous faecal nitrogen excreted.

Table-1: Endogenous amino acid losses (g/kg dry matter intake) in broiler chickens

Feedstuff	Total losses	Basal losses	Specific losses
Soybean meal	26	20	6
Wheat	27	20	7
Barley	28	20	8
Rapeseed meal	31	20	11
Field peas	34	20	14
Common bean	103	20	83
Soybean meal, 480 g/kg crude protein	14	12	2
Soybean meal, 440 g/kg crude protein	21	12	9
Canola meal	28	12	16
Cottonseed meal	39	12	27
Siriwan <i>et al.</i> ; (1993); Ravindran (2016)			

Table-2: Various protein sources used in poultry feed with guanidination % as fed

Protein sources	% Guanidination
Casein	94–100
Gelatin	83–95
Soy protein isolate	83
Soybean meal (pig)	76-84
Cottonseed meal	40-64
Rapeseed meal	75-87
Sunflower meal	40-49
Field peas	88
Fish meal	69
Meat and bone meal	53-61
Sunflower meal (poultry)	40-49
Maize	57
Sorghum	61
Wheat	63
Siriwan <i>et al.</i> ; (1994); Ravindran. (2016)	

CONCLUSION AND FUTURE IMPLICATIONS

The dietary supplementation of ingredients are desire to minimize the effected protein source for reduce the EAAL and increase amino acid digestibility in poultry. In broiler chicks the endogenous secretions are mostly effected by diet, feed stuffs and intestinal

performance are influenced. The ability of poultry nutritionists to reduce N excretion, improve flock uniformity, and improve net profit is based on the ability to formulate diets that closely meet the nutrient requirements of birds. This can be accomplished by reducing the safety margins that have been built into

diet formulation on a TAA basis. This can be achieved by formulating diets on digestible amino acid basis. Diet formulation on digestible amino acid basis would allow nutritionists to consider amino acid digestibility values of different feed ingredients when formulating diets. In poultry there are many techniques and methods are used to analyze the total EAA flow and losses. In arriving at this, the standardized ileal amino acid digestibility values of various feed ingredients that are sources of amino acids have to be determined, which relies on age-appropriate EAA flow data. Information on standardized ileal amino acid digestibility of individual ingredients will minimize variability that is often associated with feed ingredients as a result of different factors, including processing techniques and season or location of the crop. Ileal EAA values for birds at different ages or production phases that are generated from the same species or strains of birds will be required. Finally, the importance of EAA on diet formulation on digestible amino acids is enormous. Consistency in EAA loss data can be greatly increased if some of the issues raised in this review can be addressed and harmonized. This review support and highlight the dietary supplemented factors which are directly and indirectly influence on EAAL in birds. Further it's required to evaluate the root causes of specific ingredients its contribution and digestibility in poultry.

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