

ABSTRACT

Amr Ali Abdel-Rahman El-Giziry. Applications of recent technologies for the characterization of nitrogen content in some Egyptian feedstuffs for ruminants. Unpublished Doctor of philosophy, University of Ain Shams, Faculty of Agriculture, Department of Animal Production, 2007.

Nineteen feedstuffs -plant protein meals, plant protein seeds, animal protein sources, grains, by- product, roughage and forges and urea- were chosen and used for protein solubility measurements using three methods (distilled water (DW), McDogal's buffer (McD) and Cheese cloth filtered rumen fluid (RF)). *In situ* technique was applied to determine the rate of nitrogen degradability after 2, 4, 6, 8, 12, 24 and 48 hours incubation period. Electrophoresis technique was used to study the molecular weight of protein sources. Protein solubility was 100 % in the different solvents for urea, fish meals which represent the animal protein was the lowest protein solubility in different solvents, and the highest values of protein solubility was recorded for the grains and by-products feedstuffs sources, while the plant protein meals recorded in-between values. The best media suitable for protein solubility determination is (RF), which the highest average of protein solubility percent was recorded for (RF) followed by (McD) while the lowest value recorded for (DW). Nitrogen disappearance starts low at 2h after incubation then gradually increases up to 48 h incubation. The values of nitrogen disappearance after 2h ranged between (24.2 and 42.5) (sunflower meal and casein respectively) and after 48 h ranged between (61.1and 76.4) (alfalfa and cotton seed meal respectively). The rate of nitrogen disappearance in berseem protein was $\frac{2}{3}$ of the rate of nitrogen disappearance

in all proteins. Plant protein meals tested showed high rate of N disappearance ($0.7325h^{-1}$ as average) while the average of numbers of proteins consisting the protein content of each plant protein meal was (8.25) with a wide range between the low molecular weight (LMW) and high molecular weight (HMW). Plant protein seeds protein tested showed a higher protein solubility and lower rate of disappearance compared with plant protein meals. However number of protein forming the total protein content of each feedstuffs averaged (12.3) proteins with range similar to the plant protein meals. Wheat proteins were the highest in solubility. It showed the lowest rate of disappearance and contended the highest number of proteins (22) with the widest range between the (LMW) and (HMW) (118.29) among the all feedstuffs tested in the present study. On the other hand barley proteins was the lowest in solubility and the highest in rate of nitrogen disappearance containing 18 proteins with 109 range between (LMW) and (HMW). Protein of by-product protein proteins in the present study showed two extremes of solubility rice fragment protein was the most soluble protein among all feedstuffs used in the present study (19 feedstuffs) while wheat bran protein was the least soluble. On the other hand rice fragment protein had the low rate of nitrogen disappearance while wheat bran had a high disappearance.

Key Words: Protein solubility, nitrogen disappearance and electrophoresis.

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ARABIC SUMMARY.....	

LIST OF APPREVIATION

N	= Nitrogen.
CP	= Crude protein.
DCP	= Digestible crude protein.
NPN	= Non-protein nitrogen.
g	= gram
Kg	= kilogram
RDP	= Rumen degradable protein.
RUP	= Rumen undegradable protein.
AA	= Amino acids.
NRC	= National Research Council.
MW	= Molecular weight.
µl	= Micro-litter
LMW	= Low molecular weight.
HMW	= High molecular weight.
DM	= Dry matter.
MP	= Metabolisable protein.
ADICP	= Acid detergent insoluble crude protein.
DW	= Distilled water.
McD	= McDogal's buffer.
RF	= Cheese cloth filtered rumen fluid
CF	= Crude fiber.
EE	= Ether extract.
NFE	= Nitrogen free extract.
OM	= Organic matter.
OMD	= Organic matter digestibility.

U	= Urea.
SDS-PAGE	= Sodium dodecyl sulphate polyacrylamide gel electrophoresis.
h	= Hour.
B1	= Rapidly degraded true protein.
B2	= Degraded true protein and large peptides.
B3	= Slowly degraded true protein.
NDICP	= Neutral detergent insoluble crude protein.
BMM	= Burroughs mineral mixture.
ARF	= Autoclaved rumen fluid.
VFA	= Volatile fatty acids.