

( )

/ /

« »

« »

« »

« » « » « »

(NEm)

/ /

/ / / / / / /

(NEg)

TDN

/ / « »

/ / « »

TDN

(P< / ) / / « »

« » / / « »

/ / « »

(P< / ) / /

/ « » « » « »

(P< / ) / / / / / / / / / / / /

( )

/ )

( ) ( /

( ) /

(PERKIN -ELMER 35)

(jen way PFP7)

(varian specter AA.20)

*in vivo*

( )

( )

( )

( / ± / )

)

(

in situ in vivo

in vivo

(TDN)

( )

( )

in situ

TDN

( )

( )

« » « »

« »

×

( )

$$Y_{ijk} = \mu + R_i + C_j + T_k + e_{ijk}$$

j ( )

i

k ( )

( ) AOAC

(NDF)

( )

(ADF)

(b,a)

( )

( )



/ )  
 ( ) a  
 ) NRC ADF, NDF ( ) c ( ) b  
 ( )  
 Neway

( )  
 NDF  
 « » c,b,a ( , )  
 ( )  $Y_{ij} = \mu + t_i + e_{ij}$  ( )  
 ( ) SAS ANOVA  
 NRC  $T_i$   $\mu$   $Y_{ij}$   
 (NE<sub>g</sub>) (NE<sub>m</sub>)  
 ( ) NRC  $e_{ij}$

/ / ( )  
 ( )

NE <sub>g</sub>	NE <sub>m</sub>	ADF	NDF	ash	NEF	EE	CF	CP	DM
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/	/

:NEg :NEm :ash :NFE :CF :CP :DM .  
 ( )

$NE_m = / ADF\% + / CP\% + / EE\% + / NFE\% - /$   
 $NE_g = / NE_m - / , NFE = -(ADF\% + CP\% + EE\% + ash\%)$

...

:

*in vivo*

( )  
( , )

TDN

(P < / )

( )

SE= / n= ) TDN

( )

$$(y = / + / x R = /$$

TDN ( )

(y = / + / x R = / SE= / n= ):

TDN

NRC

TDN

a

( )

NRC

TDN

( / ) « »

TDN

b (P < / ) ( / ) « »

( / ) « »

(P < / ) « »

( )

( )

( )

TDN	DEE	DNFE	DCF	DCP	TDN	DNFE	EE	DCF	DCP	
/ c	/ a	/ b	/ a	/ b	/ c	/ a	/ a	/ b	/ c	
/	/ a	/ a	/ a	/ a	/ b	/ a	/ a	/ ab	/ a	
/ b	/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ ab	/ a	
/ a	/ a	/ a	/ a	/ b	/ b	/ a	/ a	/ a	/ b	
/	/	/	/	/	/	/	/	/	/	(SEM)
/	/	/	/	/	/	/	/	/	/	( )

(P < / )

:DNFE

:DEE

:DCF

:DCP

:TDN

« » « » « »

k= /					c b a			
k= /	k= /	k= /	k= /	k= /	c	b	a	
/ b	/ b	/ b	/ a	/ a	/ a	/ a	/ b	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ b	/ a	. .
/ b	/ b	/ b	/ a	/ a	/ a	/ a	/ b	. .
/ a	/ a	/ a	a	/ a	/ a	/ a	/ ab	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ b	/ a	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ a	/ b	. .
/ b	/ b	/ b	/ b	/ b	/ b	/ a	/ a	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ b	/ a	. .
/ b	/ b	/ b	/ b	/ ab	/ ab	/ a	/ b	. .
/ b	/ b	/ b	/ b	/ a	/ b	/ a	/ ab	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ b	/ a	. .
/ a	/ a	/ a	/ a	/ a	/ ab	/ a	/ ab	. .
/ b	/ b	/ b	/ b	/ a	/ b	/ a	/ b	. .
/ a	/ a	/ a	/ a	/ a	/ a	/ b	/ a	. .
/ a	/ a	/ a	/ a	/ a	/ ab	/ a	/ ab	. .

(p < / )

« » « » « »

a,b,c

(k)

(P < / )

« »

% %

a . ( )

% %

( / ) « »

%

(P < / ) ( / )

« »

« »

% %

...

:

l) ( ) ( / ) b « »  
 ( ) ( / ) « »  
 ( ) ( ) (P < / ) ( / )

( )  
 /  
 ( / / ) ( )

a

/ /

( ) ( )

« »

« »

( / ) « » a  
 (P < / ) ( / ) « »

« »

/

a ( )

/ /

/

b

« » ( / ) « »

/

/ /

( / )

/

(P < / )

*in situ*

)

NDF

(

*in situ*

( )

( , )

( )

( )

( )

% % %

( )

( )

« »

% %

(P < / )

« »

/ /

% % %

/

( ) (

) NRC

%

( / )

)

)

( ) ( )

(

## REFERENCES

3. AFRC. 1992. Nutritive Requirement of ruminant animals: Protein, Report No.9. Technical committee on responses to nutrition, Nutrition Abstracts and Reviews, series
4. AOAC. 1990. Official Methods of Analysis, 15<sup>th</sup> edn., AOAC, Washington, DC.
5. Arieli, A. 1998. Whole cottonseed in dairy cattle feeding: a review. *Anim. Feed Sci. Technol.* 72:97-110.
6. Bath, A., N.D.Stern, N. R. Merchen & J. K. Drackley. 1998. Evaluation of selected mathematical approaches used to describe the kinetics of protein degradation *in situ*. *J. Anim. Sci.* 76: 2885-2893.
7. Brodrick, C. A., & W. M. Cragic. 1980. Effect of heat treatment on ruminal degradation and escape, and intestinal digestibility of cottonseed meal protein. *J. Nutr.* 110: 2381-2389.
8. Cherny, D. J. R., J. A. Patterson. R. P. Lemenager. 1990. Influence of *in situ* bag rinsing technique on determination of dry matter disappearance. *J. Dairy Sci.* 73:391.
9. Chiou, P.W.S., & B.S.S. Wu. 1999. Protein subfraction and amino acid profiles of rumen nondegradable protein in dairy cows from soybean, cottonseed meal and fish meal. *Anim. Feed Sci. Technol.* 78:65-80
10. Dale, N. 1996. Variation in feed ingredient quality: oilseed meals. *Anim. Feed Sci. Technol.* 59:129-135
11. Fadel, J.G. 1999. Quantitative analyses of selected plant by-product feedstuffs, a global perspective. *Anim. Feed Sci. Technol.* 79:255-268
12. Fadel, J.G. 1992. Application of theoretically optimal sampling schedule designs for fiber digestion estimation in sacco. *J. Dairy Sci.* 75:2184.
13. Food and Agriculture organization. 1997. production year book.
14. Goetsch, A.L., & F.N.Owens. 1985. The effects of commercial processing method of cottonseed meal on site and extent of digestion in cattle. *J. Anim. Sci.* 60:803.
15. Harry Baxes Brown, A. M. 1983. Cotton, History Species, Varieties, Morphology, Breeding, Cultivar, Disease, Marketing and uses. Second ed.
16. Infascelli, F. T. D. Lella, & V. piccolo. 1995. Dry matter, organic matter and crude protein degradability of high protein feeds in buffaloes and sheep. *Zoot. Nutr. Anim.* 21:89-94.
17. Madrid, J., F. Hernandez, M. A. Pulgar, & J. M. Cid. 1997. *in vivo* digestibility of treated and untreated barley straw: Results of direct and by difference digestibility trials *Anim. Feed. Sci. Technol.* 65:129-138.
18. Madesen, J. T. Hveplund. 1994. Prediction of *in situ* protein degradability in the rumen, results of a European ring test. *Livest. Product. Sci.* 93:201-212.
19. Michalet – Doreau, B., & P. Cermeau. 1991. Influence of foodstuff particle size in *in situ* degradation of nitrogen in the rumen. *Anim. Feed Sci. Technol.* 35:69-81.
20. Mehrez, A. Z., & E. R. Orskov. 1977. A study of artificial fiber technique for determining the digestibility of feeds in the rumen. *J. Agric. Sci.* 88:645.
21. Nocek, J. E., 1985. Evaluation of specific variables affecting *in situ* estimates of ruminal dry matter and protein digestion. *J. Anim. Sci.* 60:1347-1358.
22. National Research council. 1996. Nutrient Requirement of Beef Cattle. National Academic press. Washington. DC. Ny.



23. National Research Council. 1989. Nutrient Requirement of Dairy Cattle. National Academic press. Washington. DC. Ny.
24. National Research Council. 1985. Nutrient Requirement of Sheep. (6 th, ed) National Academic press. Washington. DC. Ny.
25. Orskov, E. R., & I. Mcdonald. 1979. The estimation of protein degradability in the tumen from incubation measurement weighted according to rate of passage. J. Agric. Sci. 92:499-503.
26. Palmquist, D.L. 1995. Digestibility of cotton lint fiber and whole oilseeds by ruminant microorganisms. Anim. Feed. Sci. Technol. 56:231-242.
27. Papadopoulos, G., & E. Ziras. 1987. Nutrient composition of Greek cottonseed meal. Anim. Feed Sci. Technol. 18:295-301.
28. Pires, A. V., M. L. Firkins, & Y. C. Lin. 1997. Effects of heat treatment and physical processing of cottonseed and nutrient digestibility and production performance by lactating cows. J. Dairy Sci. 80:1685-1694.
29. Pond, W. G. D. C. Church, & K. R. Pond. 1996. Basic animal nutrition and feeding. Fourth edition, John Willey & Sons.
30. SAS/STAT. 1996. Users, Guid, Version 6.12 SAS institute Inc., Cary, NC.
31. Stern, M. D., A. Bach, & S. Calsamiglia. 1997. Alternative techniques for measuring nutrient digestion in ruminants. J. Anim. Sci. 75:2256-2279.
32. Titgemeyer, E. C. 1997. Design and interpretation of nutrient digestion studies. J. Anim. Sci. 75:2235-2247.
33. Torrennt, J., D. E. Johnson, & M. A. Kujawa. 1994. Co-product fiber digetibility: Kinetic and *in vivo* assessment. J. Anim. Sci. 72:790-795.
34. Tuori, M., K. V. Kausteel, p. Huhtaneo. 1998. Comparison of the protein evaluation systems of feeds for dairy cows. Livest. Prod. Sci. 55:33-46.
35. Van Keulen, J., & B. A. Young. 1997. Evaluation of acid- insoluble ash as a natural marker in ruminant digestibility studies. J. Anim. Sci. 44:-282-287.
36. Van Soest, P. J. 1994. Nutritional Ecology of the ruminant. Snd ed. Cornell univ.press, Ithaca, NY.
37. Van Soest, P. J., B. Robertson, & B. A. Lewis. 1991. Methods for dietary fiber, neutral detergent fiber and nonstarch polysaccharides in relation to animal nutrition J. Dairy Sci. 74: 3583-3597.
38. Vanzant, E. S., C. R. Cochran & E. C. Titgemeyer. 1998. Standardization of *in situ* technique for ruminant feedstuff evaluation. J. Anim. Sci. 70:2712-2729.
39. Weakley, D. C., M. D. Stern. & L. D. Satter. 1983. Factors affecting disappearance of feedstuffs from bags suspended in the rumen. J. Anim. Sci. 56:403-507.
40. Weiss, W. P. 1998. Estimating the available energy content of feed for cattle. J. Dairy Sci. 81:830-839.
41. Wilkerson, V. A., T. Y. Klopfenstein, & W. W. Stroup. 1995. A collaborative study of *in situ* forage protein dehydration. J. Anim. Sci 73:583-588.
42. Zinn, R. A., M. Montano, E., Alvarez, & Y. Shen. 1997. Feeding value of cottonseed meal for feedlot cattle. J. Anim. Sci. 75:2317-2322.
43. Zinn, R. A, & A. Plascencia. 1993. Interaction of whole cottonseed and supplemental fat on digestive function cattle. J. Anim. 71:11-17.