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PREDICTION EQUATION FOR ESTIMATING FEED VALUE FROM THE CHEMICAL ANALYSIS OF SOME CROP RESIDUES AND AGRO INDUSTRIAL BY PRODUCT

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INTRODUCTION

Natural pastures and crop residue constitute with the agro industrial by products the principale feed ressources in Senegal.

A by products inventory has been done in 1979 by MONGODIN and TASCHER. Technical norms of their using are the fact of research working and references revues (SALL, 1985 ; MBAYE, 198 ; SANSOUCY and EMERY, 1982).

Resultats obtained in Senegal are yet in exploitation. This present paper is a summary of a part of the working which has been doing now.

We would like to present here only the results concerning groundnut and cotton seed hulls which have been offered alone or those which are in an association with wealthest by products like : groundnut cake, cotton cake, branwheat or maïze, brewers'dried grain, brewer tomate, molasses and low meal of rice.

OBJECTIVES

Studies have been concerned with by products chemical analysis, volontaries intake quantities, dry matter digestibility (DMd) and nitrogen matter digestibility (OMd).

Results obtained have allowed us to establish previous equations of intake quantities and the nutritive value of various feeds.

MATERIAL AND METHODS

About ninety digestibility essays whose ten on cattle have been done. Methods are classical : in vivo and in vitro (TILLEY et TERRY) digestibility, determination of crude fiber (Weende) total nitrogen matter and mineral matter rates,

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RESULTS

FEED VALUE FOR GROUNDNUT HULLS AND COTTON SEED HULLS OFFERED ALONE (Table 1)

Groundnut hulls and cotton seed hulls are caracterized by a higher rate of fibre which is respectively 547 and 545 g/kg DM.

Cotton seed hulls are however more digestible. DM is 40 p. 100 when it is used only and 44 p. 100 when there is a mineral complementary.

The groundnut hulls has a DM digestibility which is 26 p. 100. However groundnut hulls is more consumed : 47 g DM per kg $P^{0,75}$ rather than 0.05 for the groundnut hulls which have a more highest rate of digestible nitrogen matter (40 g per kg DM). This difference is the fact of kernal residues and skin presence.

Table 1 : Feed value of groundnut hulls and cotton seed hulls offered alone to sheeps

Trials number	Drescription	Intake (g/kg DM)			p.100		g/kg DM		UF	g/kg $P^{0,75}$	
		DM	CF	TNM	DMd	OMd	DOM	DNM	Energy	VDMI	DOMI
3	Groundnut hulls	966	547	115*	26	27	912	41	0.05	47	13
2	Cotton seed hulls	963	547	60	40	41	400	-	0.29;	42	17

* The hight nitrogen matter rate is caused by the kernel residues and skin presence.

LEGEND OF TABLES

DMd = dry matter digestibility
OMd = organic matter digestibility
DOM = digestible organic matter
DNM = digestible nitrogen matter
UF = energy unit
WDMI = volontary dry matter intake
DOMI = digestible organic matter intake
CF = crude fiber
OM = organic matter
TNM = total nitrogen matter
NFE = nitrosen free extreact
F = feces
Ref = refused
GH = Groundnut hull (incorporation rate
Mol = molasses (-II- -II-
WB = wheat bran (-II- -II-

ALIMENTARY VALUE FOR COMPLEMENTED GROUNDNUT HULLS AND COTTON SEED HULLS

A series os essays with cattle and sheep has done with complemented rations which are constituted essentially with groundnut hulls or cotton seed hulls. Groundnut hulls incorporation rates affeas variously from 22 to 70 p.100 : those for cotton seed hulls are include beetween .25 and 90 p. 100 of incorporation rate.

The ingestibility of rations which are constituted essentialty with groundnut hulls reach 125 g DM per kg $P^{0,75}$ if we have an incorporation rate of 38.5 p. 1 0(at the equivalent incorporation rate (37 p. 100) rations which are constituted essentially with cotton seed hulls have been ingested in proportion to 94 g DM/kg $P^{0,75}$. This ingestibility corne after the evolution of crude fiber amount whose optimum for a maximal ingestion is 320 g per kg (graphe 1) crude fiber per kg DM (graphe 1). This evolution has n't been verified with groundnut hulls.

Completed feeds which are the source of cotton seed hulls are more digestible than those with groundnut hulls (59 p.100 against 47 p. 100).
Wheat bran and maize bran can give groundnut hulls rations more digestible (DMd between 46 and 55 p. 100) and more energetic (UF between 0.46 - 0.61). Molasses and draff can improve the consommation (107 DM/ha $P^{0,75}$).

Groundnut cake combined with molasses gives a higher rate of digestible nitrogen matter (121 g per kg MS : tables 2 - 3).

Cotton seed hulls ration are more poor in digestible nitrogen matter for a same complementation ; but there are more digestible and therefore more rich in digestible organic matter and energy. However dry matter quantities intake with groundnut hulls rations are more higher in spite this dry matter digestibility which is relatively low.

Cotton seed hulls ration hawe an ingestion energy (expressed in digestible organic matter intake DOMI) less higher but none significatisely for groundnut hulls rations (46 against 44 g DOMI per kg $P^{0,75}$ n 4) if feeds are offered in the intensive breeding whose objective is to reach higher performances.

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Table 2 : Feed value of groundnut hulls rations complemented by agro industrial by products

Trials number	Principal concentrated feed in the ration	Intake (g/kg DM)			p.100		g/kg DM		UF	g/kg $P^{0,75}$	
		DM	CF	TNM	DMd	OMd	DOM	DNM	Energy	VDMI	DOMI
4	Maize bran	955	355	104	55	56	540	52	0.60	93	93
11	Wheat bran	925	373	110	45	47	411	62	0.46	83	39
7	Brewers'dried grain + molasses	927	313	134	45	46	425	75	0.46	107	49
3	Groundnut cake + molasses	924	390	149	41	42	388	121	0.26	83	34

Table 3 : Feed value of cotton seed hulls rations complemented by agro industrial by products

Trials number	Rations description	Intake (g/kg DM)			p.100		g/kg DM		UF	g/kg $P^{0,75}$	
		DM	CF	TNM	DMd	OMd	DOM	DNM	Energy	VDMI	DOM1
1	Groundnut hulls 90 - Groundnut cake 10	965	475	123	54	55	532	61	0.53	93	37
1	Groundnut hulls 82 - Groundnut cake 10 molasse 8	936	547	84	63	62	580	34	0.63	61	38
2	Groundnut hulls 37 - Molasses 15. Wheat bran 30 Groundnut cake 6 - granicalcium 2 - Salt 1	921	327	96	58	59	542	46	0.58	94	54
2	Groundnut hull 25 - Wheat bran 27,5 - ground sorghum 25 - Groundnut cake 4 - Carbonate of lime	947	282	118	61	63	528	21	0.66	83	52

PREVISION OF RATIONS NUTRITIVE VALUE OF GROUNDNUT HULLS COMPLEMENTED WITH AGRO INDUSTRIAL BY PRODUCTS FROM THEIR CHEMICAL COMPOSITION ,

Parameters which have given prevision equations are illustrated in table 4. Used data have been obtained during essays done in Dakar. Equations established are simple (table 5) or multiple (table 6).

Simple equations y = ax + b are less precise as it is show in the correlation coefficient and standard error but they are more easier to apply.

We can see : - dry matter and organic matter digestibilities and also the energetic value of the rations are negatively influenced by the crude fiber rate

- food consumption is influenced by groundnut incorporation rate like the same before.

The more preciser relation is obtained beetween total nitrogen matter (x) and digestible nitrogen matter (y) :

$$y = 0.91\ x - 45.39\ ;\ r = 0.95\ ;\ n = 30.$$

It is sure that we have n't consider all susceptibles cases which can be met in the pratic. However resultats obtained can be used like working elements for futur homeworks and references for fieldwokers who haven't always adequat analysis means also the acces at a bibliography which allowed then a quick decision.

CONCLUSION

Groundnut hulls and cotton seed hulls are included in a series of by products studied since lot of years in Senegal.

The interest can be given to these two by products in the fact that they have been produced around the cities in the first part and in the second part they constitute good concentrated feed supports.

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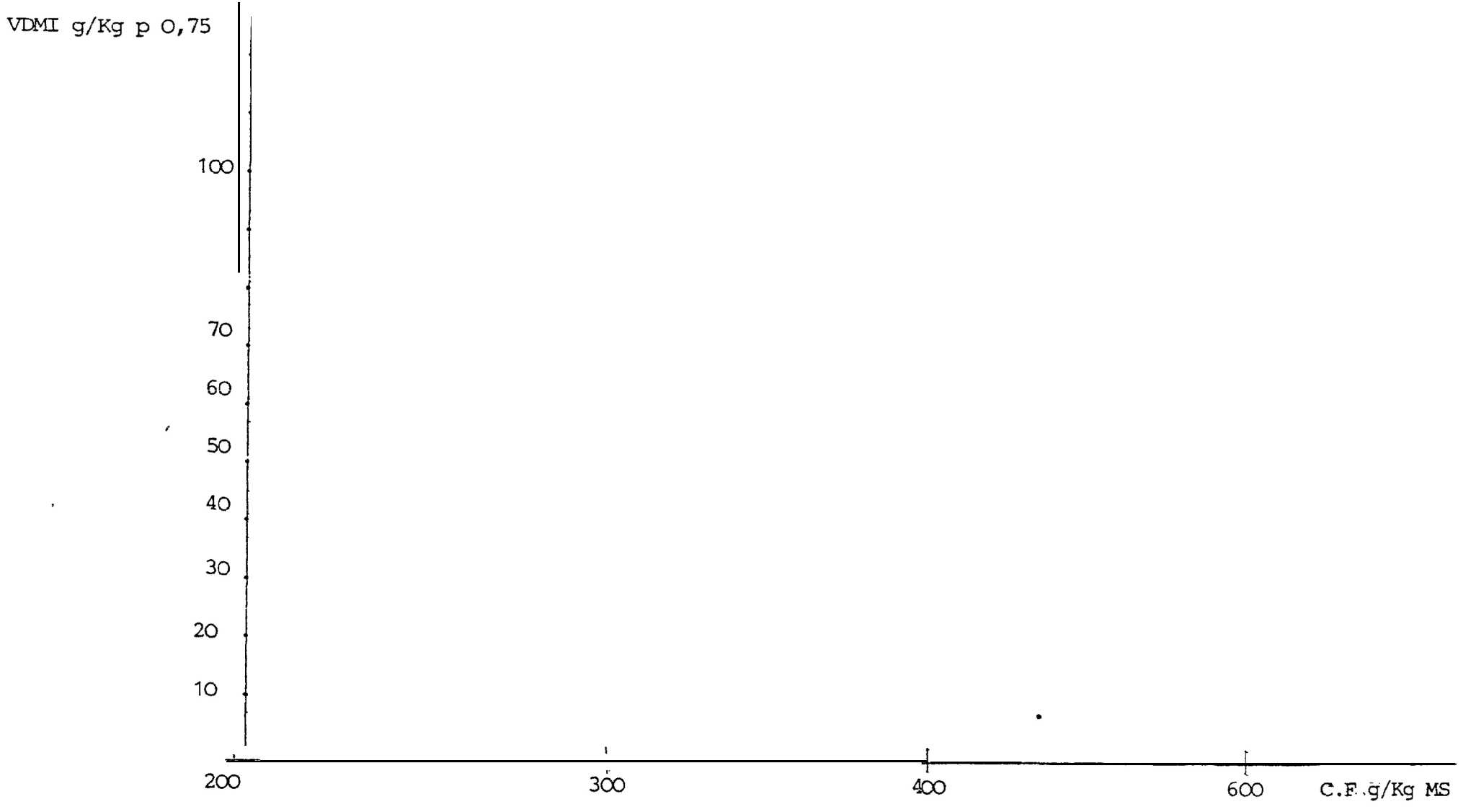
GRAPHE 1 INTAKE EVOLUTION OF COTTONSEED HULL RATIONS IN TERMS OF THEIR CRUDE FIBER RATES



They can used easier in dairy farm or in cattle fatterning if their availability is better.

In fact the principal problem of their utilization in livestock production is there are like combustible in industries and oil mills.

Table 4 : Equations variables for nutritive value prediction of combined Groundnut hulls rations

Digestibility classification	Independent variables												Dependent variables						
	GH	Mol	WB	Ref	Intake p.1000 of DM				Feces p.1000 DM				DMd	OMd	DOM	DNM	UF Leroy	VDMI	DOMI
	%	%	%	%	OM	NM	CF	NFE	OM	NM	CF	NFE							
63	100	0	0	53	964	119	459	354	954	84	625	229	26	27	259	57	0,02	47	12
64	100	0	0	38	974	84	626	223	936	75	642	200	25	28	276	28	0,07	55	15
66	100	0	0	33	970	73	561	172	970	78	561	171	38	39	383	27	-0,41	50	19
67	100	0	0	52	972	97	560	264	965	74	670	206	27	28	269	43	0,08	45	12
68	-	-	0	47	962	112	539	284	934	76	661	179	-	-	152	46	-0,21	51	8
69	-	-	0	37	975	99	538	297	943	76	672	183	21	23	226	36	-0,01	61	14
70	100	0	0	42	969	96	575	265	961	74	677	195	22	22	215	38	-0,06	54	12
80	100	0	0	47	964	135	625	148	948	124	754	131	-	-	109	23	-	43	3
81	100	0	0	28	953	117	650	148	954	112	699	122	34	34	327	43	0,16	63	21
82	100	0	0	34	955	124	653	131	953	122	661	125	-	-	111	37	-0,26	55	6
84	100	0	0	40	991	136	609	231	932	113	666	127	24	29	284	51	0,01	63	18
85	100	0	0	26	953	130	627	148	933	110	686	114	28	30	282	51	0,09	56	16
86	70	0	0	26	973	110	249	552	914	134	360	381	67	69	668	66	0,89	85	57
87	70	0	0	24	951	101	366	421	925	117	543	226	48	49	470	40	0,48	95	43
88	50	0	0	40	976	95	313	512	929	106	459	327	48	51	498	40	0,52	54	27
89	50	0	0	26	945	106	358	436	940	102	329	473	55	56	526	61	0,57	99	52
90	50	0	50	48	945	88	278	521	921	80	514	295	30	32	304	32	0,06	55	17
91	70	0	30	41	963	86	362	481	950	65	615	250	40	41	395	48	-0,06	68	27
130	73	0	25	38	934	101	457	340	933	58	654	201	28	28	261	59	0,03	64	17
131	73	0	25	29	829	100	448	261	687	73	564	234	30	42	348	49	0,16	68	24
120	38,5	0	30	35	924	127	297	472	924	127	297	472	43	44	408	69	0;29	92	38
121	38,5	0	30	26	926	97	316	489	889	112	489	273	52	54	502	43	0,48	125	63
143	60	0	38	35	945	148	459	311	909	114	381	387	41	43	409	81	0,29	57	23
235	40	12	45	11	915	139	341	405	892	99	502	264	43	44	408	82	0,21	97	40
292	30	0	49,5	23	940	114	317	480	911	104	586	207	50	52	489	62	0,47	105	51
270	30	0	47	7	926	122	273	498	905	96	431	349	52	54	496	77	0,48	113	56
228	30	0	47	12	916	129	251	499	886	98	488	278	53	55	504	83	0,42	73	37
285 a	22,5	20	0	22	916	132	265	436	909	107	439	342	45	46	419	74	0,45	110	46
285 b	22,5	20	0	25	915	131	264	440	909	107	439	342	46	47	428	74	0,46	107	46
291	22,5	20	0	19	938	139	364	361	911	116	439	323	46	47	442	76	0,46	102	45
308	28	10	0	16	908	228	367	286	895	95	607	181	36	37	336	168	0,17	85	28
314	35	12	0	10	940	133	359	364	940	133	359	364	44	45	424	76	0,46	71	30
319	58	10	0	22	919	207	390	296	919	207	390	296	44	44	409	155	0,31	64	34
320	68	10	0	25	929	143	486	272	904	91	614	187	38	40	368	87	0,21	79	29

Table 5 : Simple regression equations for nutritive prediction of groundnut hulls rations complemented with agro industrial by products.

Dependant variables (y)	Independant variables	regression equations	Standard error of estmate	Correlation Coefficient	Data number
DMd (p.100)	CF (g/kg DM)	y = - 0.06 x + 66.00	7.35	- 0.75	30
DMd (p.100)	CF (g/kg DM)	y = - 0.06 x + 67.21	7.60	- 0.74	30
UF (/kg DM)	CF (g/kg DM)	y = - 0.001 x + 0.810	0.19	- 0.68	30
DNM (g/kg DM)	TNM (g/kg DM)	y = 0.91 x - 45.39	10.19	0.95	30
VDMI (g/kg DM)	Groundnut hull (p.100 of the ration)	y = 0.61 x + 113.88	15.13	- 0.75	30
		y = - 0.38 x + 65.86	10.81	- 0.11	30
DOMI (g/kg DM)	-II- -II-	y = - 0.38 x + 65.86	10.81	- 0.71	30

Table 6 : Multiple regression equations for nutritive value prediction of groundnut hull ration complemented with agro industrial by products.

Nutritive value (dependent variable)	Multiple regression equation	Standard error of estimate	Multiple corréla-tion coefficient	Data number
DMd =	1) 0.06 NFE - 0.07 NFE_F - 0.08 CF_F - 0.17 Ref + 68.13	4.72	0.92	30
	2) - 0.04 UF - 0.03 CFF + 0.10 NM - 0.37 Ref - 17.06	5.68	0.88	30
	3) - 0.06 CF - 0.11 OM - 0.41 Ref - 31.50	6.11	0.85	30
	4) - 0.04 CF - 0.CF_F +75.29	6.82	0.80	30
DMd =	1) 0.06 NFE - 0.NFE_F - 0.09 CF_F - 93.96	4.87	0.91	30
	2) - 0.03 CF - 0.03 CF_F - 0.45 mol - 0.35 Ref + 84.73	5.80	0.87	30
	3) - 0.04 CF - 0.0CF_F + 76.32	6.83	0.79	30
DOM	1) 0.66 NFE - 0.79 - 0.91 - 1.20 GH - 2.18 Ref + 83.99	44.92	0.81	30
	2) - 0.31 CF - 0.36 CF_F NFE_F + 710.46 CF_F	67.17	0.77	30
DNM	1) 0.88 NM - 0.44 CF - 24.49	8.50	0.97	30
UF	1) 0.001 NFE + 0.3NM_F - 0.638	0.15	0.82	30
	2) - 0.001 CF + 0.003 NM_F + 0.400	0.17	0.76	30
VDMI	1) - 0.44 GH - 0.58 Ref + 121.25	15.13	0.79	30
DOMI	1) 0.06 NFE - 0.58 Ref + 20.16	7.70	0.87	30

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