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RESEARCH ARTICLE

EFFECT OF THE INCORPORATION OF REJECTS OF CASHEW NUTKERNELS IN SOWFEED ON THE CHEMICAL COMPOSITION OF MILK

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Abstract

In order to obtain more and more resistantpigletsduring lactation, thisexperimentwas set up. Its objective was to assess the quality of the milkproduced by the sowafter the use of new agricultural by-products in the feeding of lactatingsows.Thus, downgradedalmondswereintroducedinto the diets.Three types wereformulated and tested on threeseparate lots of 10 sows [(Large White x Pietrain) X (Landrace x Duroc)] each.Thesedietsconsisted of 0, 6 and 9% downgradedalmonds. Releases of cashew kernels in the food ration had no significanteffect on the dry matter, protein content of colostrum 1, 2, 3 and milk.In contrast, the use of 9% cashew kernelrejectssignificantlyincreased ($P < 0.05$) the proportions of lipid in colostrums and in milk.The lipid contents increased by 1.07%; 1.01%; 1.05% and 1.10% respectively for colostrums 1, 2, 3 and milk. Thesehigherlipid proportions couldincrease the organicenergylevel of piglets and makethem more resistant to microbialattack.

Introduction:-

Piglets under mother are often less resistant due to the low quantity and quality of breast milk. Also, the feed consumed by the sow can influence the composition of her milk and have an impact on the welfare of piglets. A diet rich in lipid administered to pregnant and lactating sows leads to an increase in the lipid content of colostrum (Pettigrew, 1981; Le Dividich et al., 1991; Quiniou et al., 2006) and improves growth rate piglets in maternity (Quiniou et al., 2000). In pigs the fatty acid profiles in the blood and tissues of suckling piglets are dependent on the type of fat fed to the sow (Farmer et al., 2008). There is thus a close relationship between the level and composition of fatty acids in the maternal diet and that of the tissues of the piglet at birth (Gerfault et al., 1999). The rate and composition of fatty acids in the feed of lactating sows will therefore define the proportion and composition of lipids in colostrum and in the sow's milk. Downgraded cashew kernels have a high proportion of fat (43%), unsaturated fatty acids (around 78%) and protein (17%) (Lacena, 2013). They are an agricultural by-product regularly used in animal feed in Côte d'Ivoire. Introduced in pig feed in floury form, their effect has been evaluated in growing and finishing animals (Yao et al., 2013 and 2016) and on the reproductive performance of females (Yao et al. 2019). In addition, these almonds could influence the level and composition of milk lipids when introduced into sow feed. The aim of this present work is to determine the effect of downgraded cashew kernels on the biochemical composition of sow's milk.

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Material and Methods:-

The studyaims to assess the impact of cashew kernel rejections on the biochemical composition of milkfromlactatingsows.

Animals and food:

Thirty (30) pregnantsowsfrom a cross (Large White x Piétrain) x (Landrace x Duroc) wereselected and dividedintothreebatches of 10 according to the establisheddiets. The lots wereidentified as lot0, lot6 and lot9. Thesesowswerefed ad libitum afterfarrowing for lot0 with the control ration L0 containing no cashew kernel suckers (Table 1). Thosefrom lot6 with the lactation ration L6 with 6% rejects cashew kernels and thosefrom lot9 received the lactation ration L9 with 9% rejects cashew kernels. The duration of the tests is 6 weeks. For thisexperiment, twofood distributions were made during the day. The first distribution took place at 8 amafter the 1st cleaning of the boxes and the second distribution at 2 pm, following the 2nd cleaning of the day. An eight-dayfeed transition wasobserved to betterprepare the sows for the new lactation diet.

Table 1:- Composition of lactation diets (g / 100 g).

		Lactation		
Ingredients		L_0	L_6	L_9
Cashew almond		0	6	9
Maize		59	53	50
Wheat bran		5	5	5
Riceflour		6	6	6
Copra oilcake		15	15	15
Soybeanoilcake		6	6	6
Fishmeal		6	6	6
Seashell		1,5	1,5	1,5
Salt		0,5	0,5	0,5
Pigpremix		1	1	1
Totals		100	100	100
Chemical composition (%)				
Dry matter		89,4	90,5	89,7
Protein		16,34	16,48	16,62
Fat		4,44	6,5	7,88
ADF (Fibers)		4,82	4,72	4,68
Calcium		0,95	0,92	0,90
Total phosphorus		0,55	0,53	0,52
Saturatedfattyacids		25,0	22,0	20,1
Monounsaturatedfattyacids		63,3	65,0	65,7
Polyunsaturatedfattyacids		9,0	11,2	13,0
Metabolisableenergy		2951,7	3030,23	3080,5

Health monitoring during gestation and lactation:

At the start of lactation, preventiveantibiotics (Oxytetracycline 20%) and vitamins (Provit) wereadministered to sowsat the start of lactation. The teatsweresanitizedwith germicide (solution 1% iodophor) and 70% ethylalcoholbeforeanysampling.

Determination of the biochemical composition of milk and colostrums:

Disinfection of udders and teats:

The udder and more specifically the teatswere dry cleanedprior to sample collection by brushing the surface witha dry towel. Afterhavingimmobilized the sows, a few streams of milkweredrawn and eliminated in order to reduce the number of bacteriapresent in the duct of eachteat. The teatsweresoaked in QUARTER MATE® Germicide (1% iodophor solution) for approximately 30 seconds thenpatted dry with a dry papertowel. The end of eachteatwasthenrubbedvigorouslywith a cottonswabmoistened (but not soaked) with 70% ethylalcohol. Alcohol has been the antiseptic of choicebecauseitevaporatesquickly and leaves no bactericidalresidue in the milksample. A new pad wasused for cleaningeachteat. Rubbingwascontinueduntil the surface of a new pad became clean. In order to

avoidrecontamination of the teats, rubbingwasdonefrom the teatsfurthestfrom the udder to the closest (Lachance, 2010).

Sample:
A flaskused for collecting the milksamples, a rack and acoolerat 5 ° C for storing the sampleswereused. Colostrum and milksampleswеretakenfrom the sows (afteroxytocin injections). When the first wasborn, colostrum 1 (COL1) wastaken. After the last piglet, itwas colostrum 2 (COL2). The dayafterfarrowing, colostrum 3 (COL3) wastaken, 2 weeksafterfarrowing, the milk (MILK) wascollected. A strictlyasepticprocedurewasfollowed for the collection of colostrum and milksamples in order to avoid contamination of the udder by the numerousmicroorganismspresent on the skin of the sides, udder and teats of the sow as well as on the hands of the sampler and in the barn. To eliminate the risk of contamination duringsampling, the udders and teatsweredisinfectedbeforehandbefore the actualmilk collection (Devillers et al., 2007). Two sets of samplesweretaken, the teattipswererubbed a second time after the first samplewastaken and before the second wastaken. The closestteatswerecollected first to reduce the risk of teat contamination duringmilk collection. The cap of the 10 cm high, 15 mLcapacity POTS TUBES ROLLERS® vialwasremoved, and withouttouchingitsinner surface, itwasorienteddownward. The teatwasorientedhorizontally and the stream of milkwasdirectedinto the bottle. Samples of approximately 10 mL of milkweretaken. The vialswerethenrecapped as quickly as possible to reduce the risk of contamination (Klobasa et al., 1987).

Analysis of samples:
The samples once takenwereplaced and stored in a coolerat 5 ° C. In the laboratory, bromatologicalanalyzes on thesesampleswereimmediatelycarried out. The dry matter, total protein and fat contents weredetermined.

Statisticalanalysis
Biochemicals compositions of colostrum and sow'smilkwere analyzed by ANOVA (analysis of variance) using STASTISCA 7.1 software. Tukey's test was used to compare the means of impact of downgraded cashew kernels.

Results:-

The use of rejects of cashew kernels in food rations has no significanteffect on the dry matter, protein contents of colostrum 1, 2, 3 and milk. The average dry matter and protein contents are respectively 24.30 ± 0.50 and 16.25 ± 0.51 for colostrum 1, 23.33 ± 0.70 and 14.80 ± 0.55 for colostrum 1. colostrum 2, 21.45 ± 0.63 and 8.83 ± 0.70 for colostrum 3, and 19.70 ± 0.35 and 5.1 ± 0.08 for milk. In contrast, the use of 9% cashew kernelrejectssignificantlyincreased ($P < 0.05$) the proportions of lipid in colostrums and in milk. The lipid contents increased by 1.07%; 1.01%; 1.05% and 1.10% respectively for colostrums 1, 2, 3 and milk (Table 2).

Table 2:- Biochemical composition of sow'smilk by feedtreatment (%).

Composition	Diets		
Composition Colostrum 1	**L_0**	**L_6**	**L_9**	**Means**
Dry matter	24,33 ± 0,50^a	24,25 ± 0,49^a	24,40 ± 0,52^a	24,30 ± 0,50
Protein	16,24 ± 0,55^a	16,30 ± 0,43^a	16,19 ± 0,53^a	16,25 ± 0,51
Lipid	4,48 ± 0,28^a	4,87 ± 0,32^{ab}	5,55 ± 0,33^b	-
Composition Colostrum 2				
Dry matter	23,31 ± 0,77^a	23,36 ± 0,65^a	23,33 ± 0,68^a	23,33 ± 0,70
Protein	14,84 ± 0,57^a	14,77 ± 0,58^a	14,83 ± 0,54^a	14,80 ± 0,55
Lipid	4,24 ± 0,30^a	4,58 ± 0,27^{ab}	5,25 ± 0,41^b	-
Composition Colostrum 3				
Dry matter	21,45 ± 0,64^a	21,56 ± 0,62^a	21,39 ± 0,65^a	21,85 ± 0,63
Protein	8,73 ± 0,71^a	8,85 ± 0,65^a	8,89 ± 0,75^a	8,83 ± 0,70
Lipid	7,61 ± 0,83^a	7,95 ± 0,79^{ab}	8,66 ± 0,85^b	-
Composition Milk				
Dry matter	19,54 ± 0,38^a	19,79 ± 0,34^a	19,76 ± 0,33^a	19,70 ± 0,35
Protein	5,07 ± 0,09^a	5,12 ± 0,08^a	5,11 ± 0,09^a	5,1 ± 0,08
Lipid	8,15 ± 0,32^a	8,69 ± 0,30^{ab}	9,25 ± 0,34^b	-
The means per dietassignedwithdifferentletters a and b are significantlydifferent ($P < 0.05$) L0, L6 and L9 are feed for lactatingsowscontaining 0, 6 and 9% cashew nutsrespectively				

Discussion:-

The increase in lipid contents of all colostrum and milk samples taken after incorporation of rejects of cashew kernels in food rations may be related to the fact that some lipid material cannot be synthesized by the animal. , their presence in the fats produced by animals is linked to that of the food consumed (Courboulay et al., 1999). Indeed, the energy provided by the additional fat ingested by the sow is of very little benefit to it and is mainly directed to the udder (Boyd et al., 1978). Moreover, if a feed for pregnant and lactating sows enriched in lipid makes it possible to improve the growth rate of piglets in the farrowing unit (Quiniou et al., 2000) and their survival (Pettigrew, 1981; Le Dividich et al., 1991 ;Quiniou et al., 2006), this implies that an increase in the lipid content of colostrum and in milk is also noted. Thus, increasing the fat content of feeds formulated with cashew nut kernels increases the lipid proportions of the sow's milk. This observation is in agreement with the results of Dillon (1989). For this author, food constantly changes the composition of milk, but within relatively narrow limits (1 to 5%). The results obtained are, moreover, different from those of Roy (2003) who maintains that food intake does not significantly modify the chemical composition of milk in general. These proportions of lipid in greater quantity (certainly in polyunsaturated fats) could increase the organic energy level of piglets and make them more resistant to microbial attacks. This is in agreement with Farmer et al. (2008), who state that in pigs, fatty acid profiles in the blood and tissues of suckling piglets are dependent on the type of fat fed to the sow. For them, fatty acids (polyunsaturated) activate the development of the immune system and influence the synthesis of glycogen which is an essential source of energy for newborn piglets..

Conclusion:-

During lactation, the use of 9% cashew almond suckers in sowfeedsignificantlyincreased the lipid proportions in colostrums and in milk ($P < 0.05$). An increasethatwouldbebeneficial for piglets, certainlythanks to a higher proportion of polyunsaturatedfattyacidswhichactivate the development of the immune system and thereforemakethem more resistant to attacks. In addition, furtherstudiesshouldbecarried out to determine the fattyacid composition of colostrum and sowmilklipids and to betterassesstheir impact on the growth and survival of pigletsafterfarrowing.

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