

SUMMARY

PRODUCTION OF VOLATILE FATTY ACIDS BY STRICTLY ANAEROBIC BACTERIA
 IN THE DIGESTIVE TRACT OF « GNOTOXENIC » MICE.
 INHIBITORY EFFECT ON *SHIGELLA FLEXNERI*

Various strains of strictly anaerobic bacteria producing volatile fatty acids (VFA) *in vitro*, or various bacterial mixtures from the microflora of holoxenic animals, were implanted in the digestive tract of axenic mice.

The *in vivo* production of VFA was then measured in the caecum or the faeces of these « gnotoxenic » animals, and we studied the inhibitory effect of the VFA thus produced on a strain of *Shigella flexneri*.

There is little relationship between *in vitro* VFA production by bacterial strains and VFA concentrations present in the caecum of animals implanted with these strains *in vivo*. Only some strains are good producers of VFA, and if weak VFA producing strains are accumulated in the same animal, their productions are not additive. Caecal and faecal concentrations of VFA of the same order as those measured in holoxenics were only obtained with gnotoxenics carrying a complex mixture of unidentified strictly heat-resistant anaerobic strains.

In those « gnotoxenic » animals, there were large variations of caecal and faecal VFA concentrations in relation to time. These variations were even higher than those in the holoxenics. The maximum amount of VFA in the caecum of gnotoxenic animals may sometimes be observed several weeks after establishment of the producer strains, and the addition of lactose to the diet did not affect the production of these VFA.

Finally, the correlation between VFA production and the elimination of *S. flexneri* is very low. This strain is very efficiently eliminated by a complex flora before any large VFA production in the caecum, while another flora producing a high amount of VFA several weeks after implantation, has only a very limited antagonistic effect.

UTILISATION DE L'AZOTE ET DES ACIDES AMINÉS
 CHEZ LE RAT AXÉNIQUE

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Nous utilisons le rat axénique comme animal expérimental dans l'étude de l'influence de la flore digestive dans la digestion de l'azote. L'expérience que nous relatons ici concerne 8 rats axéniques et 10 rats holoxéniques (de souche Fischer du service des animaux sans germes du C. N. R. S. de Gif). Ces animaux ont été placés en cage à bilan individuelle. Pendant deux périodes consécutives de 5 et 6 jours les mesures de consommation de l'aliment (L 356 stérilisé à la vapeur), la récolte de l'urine et des fèces, le poids individuel des animaux furent assurés quotidiennement. Les teneurs en azote et en acides aminés furent déterminées sur les échantillons d'aliment, urine et fèces groupés par période. Le poids moyen des rats axéniques et holoxéniques

était de 196 et 190 g respectivement au début de la période de mesures. Nous avons observé que les vitesses de croissance des animaux des 2 groupes sont semblables : 617 mg/j/rat pour les axéniques et 619 mg/j/rat pour les holoxéniques. Pour des quantités d'aliment ingérées égales, la digestibilité apparente de l'azote est plus importante chez les holoxéniques (85,1 et 85,3 p. 100) que chez les axéniques (72,6 et 80,5). L'analyse des acides aminés montre qu'il y a de faibles différences de composition centésimale entre les fèces des animaux des deux groupes. Les digestibilités apparentes de la plupart des acides aminés (en particulier : tyrosine, sérine, thréonine, cystine) sont plus importantes dans le groupe holoxénique que dans le groupe axénique. L'augmentation de l'absorption d'acides aminés liée à la digestion microbienne serait donc, au moins dans nos conditions expérimentales, plus importante que l'augmentation de l'excrétion fécale d'acides aminés due à leur incorporation dans les corps microbiens dans la partie distale de l'intestin.

SUMMARY

UTILIZATION OF NITROGEN AND AMINO ACIDS BY THE GERM-FREE RAT

Germ-free rats were used to study the effect of the digestive flora on the digestion of nitrogen. The present experiment was made with 8 germ-free and 10 conventional rats (Fisher strain, from the service of germ-free animals of the C. N. R. S., Gif). The animals were placed individually in balance crates. During 2 consecutive periods of 5 and 6 days, measurements of the food intake (steam-sterilized L 356), faeces and urine collections and determination of the individual weights of the animals were made every day. Nitrogen and amino acid contents were determined in the samples of food, urine and faeces grouped per period. The mean weight of the germ-free and conventional rats were 196 and 190 g respectively at the beginning of the period of measurements. The growth rates of the animals from the 2 groups were similar : 617 mg/day/rat for the germ-free animals and 619 mg/day/rat for the conventional ones. As related to an equal feed intake, the apparent digestibility of nitrogen was higher in the conventional (85.1 and 85.3 p. 100) than in the germ-free animals (72.6 and 80.5 p. 100). Analysis of the amino acid composition of the faeces showed that there were small differences between the 2 groups. The apparent digestibilities of most amino acids (in particular : tyrosine, serine, threonine, cystine) were higher in the conventional than in the germ-free group. The increase of the amino acid absorption related to the bacterial digestion would therefore, at least in our experimental conditions, be larger than the increase of the faecal excretion of amino acids owing to their incorporation into the bacterial bodies in the distal part of the intestine.

LA MICROFLORE DIGESTIVE DU VEAU NOUVEAU-NÉ

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L'étude écologique de la microflore digestive du veau préruminant a pour but de connaître les espèces bactériennes en vue de contrôler en tout ou partie leur implantation et leur équilibre dans le tube digestif. En effet, la microflore intestinale conditionne en partie la santé et la crois-