

菜籽饼、土霉素、黄连素和穿心莲对 育肥猪甲状腺功能的影响*

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关键词 菜籽饼 土霉素 黄连素 穿心莲 猪甲状腺

一、序 言

甲状腺在动物体内具有控制产热、调节蛋白质等物质的代谢和促进生长发育等多种功能。有关菜籽饼对甲状腺活动的影响已有不少研究报导。Hussar 等^[1]观察到菜籽饼(作为蛋白质补充料)喂猪时,其甲状腺发生肿大,血清中甲状腺激素浓度降低。其后 Bowland^[2]、Marangos^[3]、Grandhi^[4]和 Mckinnon^[5]等也报导了菜籽饼对猪甲状腺的损伤作用,但对猪的生长、发育的影响则不尽相同。不同喂量的菜籽饼对甲状腺功能影响如何,尚不清楚。可作为饲料添加剂的土霉素、黄连素和穿心莲对猪甲状腺功能的影响,报导甚少。

我国菜籽产量居世界第二位,榨油后的饼粕约含粗蛋白35~37%。充分合理利用这一资源,对发展养猪业有重要作用。本试验结合育肥猪饲料配合研究,着重观察不同喂量的菜籽饼、土霉素、黄连素和穿心莲对猪的甲状腺吸碘率、血清中甲状腺素(T_4)浓度的影响,并注意甲状腺功能与猪的增重的关系。

二、材料和方法

1. 菜籽饼组

试验于1981年7月10日至9月11日进行。选用荣昌猪32头,体重约35kg,分为6组。每组的饲粮中所含菜籽饼比例分别为0、6%、12%、18%、24%和48%(占风干饲粮的百分数)。除最后一组(含菜籽饼48%)所用试猪为两头外,其余各组皆为6头。饲粮均按等能、等蛋白质原则配合。所用非菜籽饼蛋白质补充料种类相同,蛋白质间比例控制稳定。菜籽饼选用四川省目前有代表性的95型机榨饼。采用当年新收的菜籽,其中甘兰型约占93%。

每日喂料2次,其中精料系撒饲,使其任食;青料定量,每次0.5kg;饮水供应不断。半月称重一次^[6]。

用以上日饲粮喂两个月后,自前腔静脉抽取试猪血液,应用竞争蛋白质结合分析法(药盒由中国科学院原子能研究所供给)测定血清中 T_4 的含量。

抽血后,将 $Na^{131}I$ 液经背侧腓肌注入各组试猪体内,剂量为每头 $5\mu Ci$ 。注射后经6、24、48、72小时用 γ 闪烁探头和FH-408型自动定标器测定甲状腺吸碘率。测定时探头的闪烁晶体与甲状腺处的皮肤相距25cm。为减少颈部血管中放射性的干扰,选择腿部进行测定,将此数值从颈部测数中减去。考虑到猪只体重不一,甲状腺与皮肤间的距离彼此会有差异,亦即测定中探头的晶体与甲状腺腺体间的距离会有差异,因此对假颈标准进行了校正。方法是在测定期间选择体重有代表性的不同猪只,杀死后立即将假颈标准放射源(^{131}I)埋置于甲状腺部位,测数、进行校正。

2. 土霉素、黄连素、穿心莲组

试验动物选用日龄相近、体重基本一致的长荣(长白×荣昌)杂交双月断奶仔猪60头,每组均为6头。其中的土霉素试验分5组,其饲粮中分别含土霉素(89.5U/mg)0、100、400、500、1500ppm。黄连素(盐酸黄连素,含量87.5%)试验分3组,其饲粮中分别含黄连素0、10、50ppm。穿心莲(穿心莲内酯,含量98.81%)试验亦分3组,其中的对照组即为黄连素试验中的对照组,其余2组的饲粮中各含穿心莲10、50ppm。

基础饲粮的组成随试猪体重增加的不同阶段而异,青料包括莲花白、聚合草、红苕藤等^[7]。对照组喂基础饲粮,其他各组在基础饲粮中分别添加不同剂量的土霉素、黄连素或穿心莲。每日饲喂两次,喂时先投青料,后投混合料。试猪体重在20~35kg阶段,每头每日青料给量为0.5kg,在35~90kg阶段为0.8kg。混合料按食欲

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饱饲, 饮水持续供应。定时称重。

用以上饲料喂猪, 经一定时间, 即土霉素试验经 51 天 (1981 年 5 月 21 日至 7 月 11 日), 黄连素与穿心莲试验经 40 天 (1981 年 6 月 5 日至 7 月 15 日), 用前述方法测定血清中 T_4 的浓度和甲状腺吸碘率。

三、结果与讨论

菜籽饼、土霉素、黄连素和穿心莲对猪甲状腺吸碘率的影响见表 1 所列数值。将各试验组的吸碘率高峰值、

表 1 菜籽饼、土霉素、黄连素和穿心莲对猪甲状腺吸碘率的影响

组 别		甲状腺吸碘率(%)			
		6h	24h	48h	72h
菜籽饼 (%)	0	16.31±5.70	20.17±5.97	24.24±5.01	25.35±6.10
	6	22.10±5.58	24.69±4.74	29.14±3.64	31.69±5.02
	12	22.85±5.95	28.49±7.91	33.64±10.43	33.93±12.67
	18	17.99±7.24	22.98±4.14	26.10±5.29	28.29±5.20
	24	11.73±4.84	13.62±5.84	14.15±3.59	15.88±5.89
	48	7.66±0.37	10.29±0.26	12.77±0.21	12.30±2.76
土霉素 (ppm)	0	12.97±3.03	16.85±3.71	18.77±4.51	17.87±4.27
	100	13.26±4.24	25.43±3.92	26.50±6.74	27.42±5.65
	400	21.08±4.09	28.90±13.67	29.29±8.32	29.73±9.15
	500	25.86±9.08	30.83±12.30	32.02±12.15	33.58±11.93
	1500	22.01±10.65	29.59±9.59	28.23±7.68	29.31±8.39
黄连素 (ppm)	0	8.81±2.12	14.22±4.06	15.32±4.15	15.37±3.98
	10	10.82±2.45	15.50±3.74	17.92±3.45	17.77±4.29
	50	6.85±2.18	11.67±2.85	12.97±2.83	12.28±3.24
穿心莲 (ppm)	0	8.81±2.12	14.22±4.06	15.32±4.15	15.37±3.98
	10	8.83±2.87	14.06±4.32	16.48±3.89	16.52±3.29
	50	8.26±4.40	13.35±4.57	14.81±4.80	14.84±4.76

血清 T_4 浓度和增重分别对菜籽饼等诸因素的喂量作图, 得图 1、表 2。

由试验所得数据可以看出试猪的甲状腺吸碘率、血清 T_4 浓度和增重随诸因素喂量的不同而发生变化。

1. 由图 1 可见甲状腺吸碘率、血清 T_4 浓度和增重对菜籽饼喂量的关系有近似之处: 喂量低时三项指标高于对照, 喂量高时则相反, 且都以 12% 喂量为峰值和转折点。

2. 由表 2 可见, (1) 试猪饲料中含有 100~1500 ppm 土霉素的条件下, 甲状腺吸碘率和增重皆高于对照, 而血清 T_4 浓度则均低于对照。(2) 饲料中含 10ppm 黄连素时, 甲状腺吸碘率和血清 T_4 浓度皆高于对照; 而含 50ppm 时, 皆低于对照。从增重情况看, 两种喂量条件下都较对照为高, 其中以 10ppm 的为好。(3) 饲料中含穿心莲 10ppm 时, 甲状腺吸碘率和血清 T_4 浓度皆略高于对照; 含 50ppm 时, 皆略低于对照。增重则在两种喂量都高于对照, 其中也以 10ppm 的为好。

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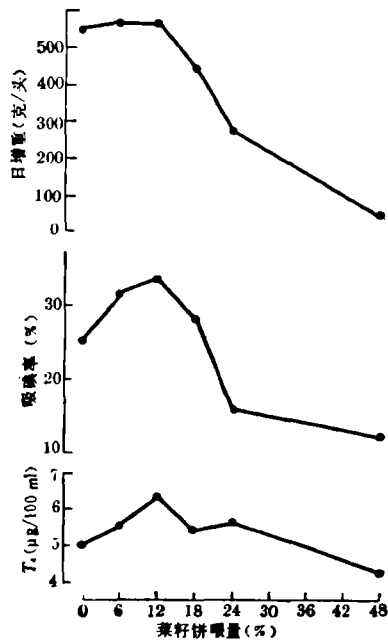


图 1 菜籽饼对猪甲状腺吸碘率、血清中 T_4 浓度和增重的影响

The fattening swine were rationed with different portions of rapeseed meal, terramycin, berberine hydrochloride and andrographolide. The effects of these factors on the uptake of radioiodine (^{131}I) in thyroid glands and on the serum level of thyroxine (T_4) and swine's weight gain per day were observed. The results indicated that the uptakes of ^{131}I , serum levels of T_4 and weight gains in the groups rationed with rapeseed meal of less than 18% were higher than that of the control group; the highest was that of the group fed with 12% rapeseed meal. When the swine were rationed with 100~1500ppm terramycin, the ^{131}I uptakes and weight gains were higher than that of the control, but the T_4 levels were lower than that of the control. In the groups rationed with 10ppm berberine hydrochloride or andrographolide the ^{131}I uptakes, T_4 concentration and weight gains were higher than that of the control. In the groups supplied with 50ppm of berberine hydrochloride or andrographolide, the ^{131}I uptakes and T_4 concentration were lower than that of the control; but the weight gains were still higher than that of the control. The data obtained would contribute to the understanding of the relationship between thyroid function and weight gain of swine, and to the make-up of diet for swine.

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表2 土霉素、黄连素和穿心莲对猪血清 T_4 浓度和日增重的影响

土霉素			黄连素			穿心莲		
喂量 (%)	T_4 ($\mu\text{g}/100\text{ml}$)	日增重 (克/头)	喂量 (ppm)	T_4 ($\mu\text{g}/100\text{ml}$)	日增重 (克/头)	喂量 (ppm)	T_4 ($\mu\text{g}/100\text{ml}$)	日增重 (克/头)
0	4.25 ± 0.79	588	0	4.10 ± 0.86	500	0	4.10 ± 0.86	500
100	3.53 ± 0.47	594	10	4.47 ± 0.80	547	10	4.41 ± 0.86	602
400	2.89 ± 0.62	663	50	3.43 ± 0.12	527	50	3.99 ± 0.71	524
500	3.12 ± 0.67	640						
1500	3.14 ± 0.94	677						

据以往研究者的报告, 菜籽饼对甲状腺多是损伤作用。本试验所得数据似乎说明, 低剂量的菜籽饼对甲状腺功能有刺激作用, 高剂量则有损伤作用。

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Preparation of tritium-labelled rubescensine A

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Tritiated rubescensine A was prepared by tritium gas exposure method under 1kV electric discharging. The specific activity of product was 207.7mCi/mmol with radiochemical purity over 95%.

Labeling pectin and dextran with ^{14}C

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Labelad pectin and dextran was obtained by condensation of the polysaccharides with ^{14}C -labeled cyanide in the presence of a carbonate-bicarbonate buffer. The products were purified using an ion exchange resin. Experimental results show that the structures of labeled polysaccharides were not change. Evidently specific activities of products were 3~4Ci/mg (^{14}C -pectin) and 1 μCi /mg (^{14}C -dextran). Radiochemical purities of products were more than 97%. The content of monosaccharide is less than 3%.

In vivo distribution and organ imaging of ^{11}C -benzoic acid and ^{11}C -propionic acid in animal

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After ^{11}C -benzoic acid was intravenously injected to mice of ICR strain; the radioactivity was rapidly localized in kidney. The maximum uptake rate of kidney reached $52 \pm 5.7 \text{ D\%/g}$. Observation of concentrating and elimination of ^{11}C -benzoic can be carried out within 15 minutes after intravenous injection to the rabbit under kinetic imaging. The propioic acid uptake rate of myocardium of mice was $12.5 \pm 4.2 \text{ D\%/g}$. Either uptake ratio of heart to lung or that of heart to liver was around 1.9.

Effects of rapeseed meal, terramycin, berberine hydrochloride and andrographolide on thyroid function in fattening swine

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