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Current Situation and Developmental Suggestions on Shortage of Feeding Protein Resources in Chinese Pig Industry

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Current Situation and Developmental Suggestions on Shortage of Feeding Protein Resources in Chinese Pig Industry

Abstract

Pig industry is the pillar industry of animal husbandry in China and serves as a key part of the agricultural modernization system. However, the serious shortage of feeding protein resources and the low utilization rate of non-grain protein resources have restricted the development of modernization of animal husbandry in China. Therefore, according to the spirit of the Nineteenth National Congress of the CPC Central Committee and based on the Structural Reform of Supply-Side, this article offered relevant suggestions on the challenges faced by the current pig industry, which will further guide the development of animal husbandry and feed industry with "environmental friendliness and resource conservation".

Keywords

pig industry; low-protein diet; non-grain protein resources

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我国蛋白质饲料资源短缺现状与解决方案

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摘要 养猪业是我国畜牧支柱产业，也是农业现代化体系的重要组成部分。而我国饲用蛋白资源严重匮乏以及大宗非粮蛋白资源利用率极低，制约了我国畜牧业现代化进程。因此，文章根据党的十九大精神，从供给侧结构性改革为出发点，对当前养猪业面临的挑战提出相关建议，为发展“环境友好和资源节约”畜牧饲料工业“添砖加瓦”。

关键词 养猪业，低蛋白日粮，非粮蛋白资源

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畜牧业是现代农业产业体系的重要组成部分。大力发展畜牧业，对促进农业结构优化升级，增加农民收入，改善国民膳食结构，提高国民体质具有重要意义。党的十九大对我国农业现代化和乡村振兴又提出了新的要求，而推动畜牧业在农业中率先实现现代化，是畜牧业助力“农业强、农村美、农民富”的重大责任和使命。

生猪产业一直是我国畜牧业的支柱产业，2017年我国猪肉产量高达5340万吨，占全球总产量的48%。与牛、羊、禽产业比较，生猪饲养总产值比重约56.6%，产值接近1.3万亿元人民币。庞大的生猪产

业促进了我国饲料业的蓬勃发展，从2015年起，我国工业饲料年总产量已经连续3年超过2亿吨。《全国饲料工业“十三五”发展规划》明确指出饲料产业的发展不仅为现代养殖业提供坚实的物质基础，也为粮食和粮油食品工业副产物高效转化提供有效途径，对促进农业增效、农民增收和农村发展具有不可替代的作用。

近几十年以来，我国生猪饲料配方参照西方国家，以“玉米-豆粕”型日粮为主，包括饲料行业在内，2017年我国大豆总需求量达到11079万吨，但是国内大豆产量每年不超过1500万吨（图1）。由

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于国内蛋白源饲料严重缺乏，导致我国饲料行业过度依赖于大豆进口。海关数据显示，2017年我国大豆进口9553万吨，较2016年增加1162万吨，这严重阻碍了我国饲料业和畜牧业的发展。因此，本文结合国情对饲料行业蛋白资源紧缺问题提出相关建议。

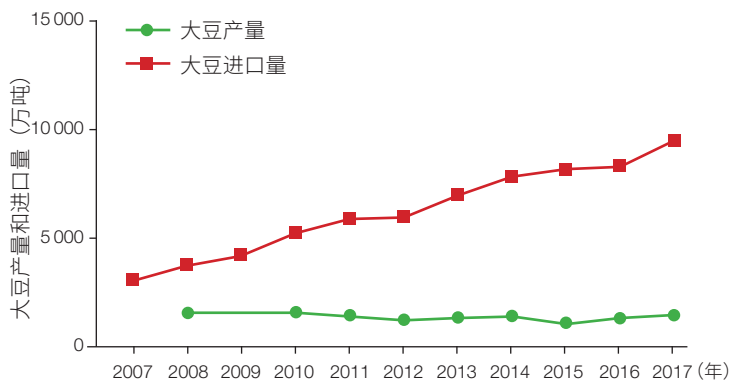


图1 我国大豆近10年来生产和进口情况

1 大力推广低蛋白饲料

低蛋白日粮是指将日粮蛋白质水平按猪营养需要（nutrient requirements of swine, NRC）推荐标准降低1—3个百分点，然后通过适当添加合成氨基酸，降低蛋白原料用量来满足动物对氨基酸需求（即保持氨基酸的平衡）的日粮。笔者团队通过降低配方中豆粕使用量（3%左右豆粕添加量），并平衡必需氨基酸以及其他功能性氨基酸（支链氨基酸等）设计的低蛋白饲料对仔猪生产性能完全没有影响^①。因此，在饲料行业，有必要鼓励和推广相关科研机构和企业进行低蛋白日粮研发。同时，积极引导畜牧企业对饲料蛋白含量的认知。许多中小养殖场过度看重饲料蛋白含量，认为蛋白含量低即为劣质饲料，因此对中小型养殖场主有必要进行培训和引导。

除了节约蛋白资源外，低蛋白日粮还能够保护缓解并降低生产成本。猪生产过程中排泄物（粪和

尿）中含有大量的氮，对猪舍环境卫生具有严重的负面影响。同时，氮的排放也会对土壤、大气以及水源等人类生存环境造成严重危害。《全国第一次污染源普查公报》显示，我国畜禽养殖业排放的化学需氧量达到1268.26万吨，占农业源排放总量的96%；总氮排放量占农业源氮排放总量的38%。这些氮污染物主要来自于饲料中未被利用的蛋白质，我国养猪生产中饲料蛋白利用率远远低于其他国家。而采用低蛋白日粮同时能够显著提高猪对饲料蛋白的利用效率，从而降低氮排放，缓解养殖过程对环境的危害。研究发现，与用普通饲料喂养猪相比，采用低蛋白日粮喂养，饲料利用效率提高7.51%，猪粪便中氮含量减少27.9%，同时还能减少温室气体排放^[1]。绿水青山就是金山银山，环境安全成了全民共识。因此，发展低蛋白饲料是实现“环境友好”型饲料工业的有效途径。

蛋白饲料原料成本在饲料配制的总成本中占到35%以上。因此，通过减少饲料中蛋白原料含量，可以有效降低饲料生产成本。由于国内饲料价格普遍偏高，猪肉生产成本较大，导致近年来我国猪肉进口数量不断增多。虽然我国2017年猪肉进口量较往年有所下降，但是也高达121.7万吨。大量的进口对国内生猪市场以及中小型养殖户带来了强大的冲击。因此，优化饲料配方结构（低蛋白日粮）、降低生产成本势在必行。

2 大力研发和应用非常规蛋白质资源

我国非常规蛋白资源非常丰富，其中包括农产品加工副产物（如菜籽粕、棉籽粕和花生粕等杂粕，玉米、小麦、大米等谷物加工副产物）、植物及其副产物（如牧草、野草、桑叶、构树叶以及人用蔬菜茎、叶与藤等）、糟粕类（如酒糟、醋糟、

^① 配方效果已经得到生产试验证实，数据尚未正式发表。

酱渣和果渣等)、餐饮残渣剩余物、动物源加工副产物等。初步统计,我国农产品加工副产物每年超过5亿吨,但是综合利用率极低,因此我国目前资源浪费现状亟待改善^[2]。

目前,我国非常规蛋白资源开发利用受到多种因素影响和阻碍。①多种蛋白资源受到季节和地理文化因素影响,限制了广泛运用。②国内缺乏不同蛋白资源收割和加工规范标准,影响到其饲料配制。例如,蛋白桑具有较高蛋白含量,是一种理想的饲料蛋白资源,但是不同采摘时间点对其蛋白含量影响较大,同时也缺乏较为统一的加工利用标准,这极大地限制了蛋白桑在饲料企业的运用。③多种蛋白资源含有毒素或抗营养因子,降低了饲料营养价值,影响动物的生长和健康。例如,杂粕普遍含有硫代葡萄糖苷、游离棉酚、植酸、单宁、芥子碱、皂素等抗营养因子。然而,目前我国饲料中有害物质和抗营养因子等的去除方法有限,因此需要大力研究非粮蛋白资源中有害物质和抗营养因子含量快速检测以及有效去除方法,为替代豆粕饲料提供保障。④当前饲料营养价值评定标准的缺乏,以及蛋白效价与氨基酸平衡不能很好满足动物生长需要,也造成了大量蛋白质资源的浪费。

总之,我国非常规蛋白资源储备巨大,但是利用率较低。因此,迫切需要深化饲料行业供给侧结构性改革,通过大力发展和鼓励非常规蛋白资源在饲料行业的运用,避免资源浪费,节约豆粕等资源,缓解我国饲料蛋白资源严重匮乏的现状,实现产业转型升级发展。

3 品种改良

目前,我国猪种主要依赖进口国外优质猪种,其不仅成本高,同时对“杜长大”为主的商品猪对营养消化吸收率的研究已经达到瓶颈。此外,地方猪种长期受到忽视,缺乏对优良地方品种的保护和开发利用。我国现有118个地方猪种,被收录于联合国粮食及农业组织(FAO)家养动物多样性信息系统,占全球猪种资源的1/3^[3]。这些猪种普遍具有繁殖力高、耐粗饲、抗逆性强、肉质好、对周围环境高度适应等优良的种质特性^[3]。因此,利用国内优质的地方种猪资源,结合国外优质猪种,开发新品种种猪,以求对营养消化吸收能力进行突破,是我国养猪业乃至整个养殖业可持续发展的基础。

我国饲料生产蛋白资源的严重匮乏和生猪养殖过程中氮排放对环境的危害,已经成了制约我国饲料和养殖业的两大瓶颈问题。目前,我国进入农业供给侧结构性改革攻坚时期,根据国情优化饲料配方,合理设计低蛋白日粮,并大力发展非常规蛋白饲料替代饲料中豆粕用量,才能确保我国饲料和养殖业可持续发展。

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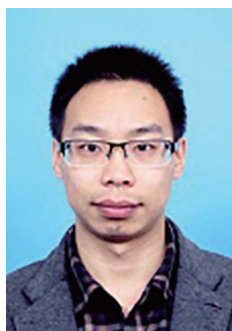
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Abstract Pig industry is the pillar industry of animal husbandry in China and serves as a key part of the agricultural modernization system. However, the serious shortage of feeding protein resources and the low utilization rate of non-grain protein resources have restricted the development of modernization of animal husbandry in China. Therefore, according to the spirit of the Nineteenth National Congress of the CPC Central Committee and based on the Structural Reform of Supply-Side, this article offered relevant suggestions on the challenges faced by the current pig industry, which will further guide the development of animal husbandry and feed industry with “environmental friendliness and resource conservation”.

Keywords pig industry, low-protein diet, non-grain protein resources



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