CHAPTER 12

RECONSTRUCTION OF THE MUSHROOM INDUSTRY IN POLAND

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1. POLISH MUSHROOM INDUSTRY

The Champignon de Paris cultivation method was 'imported' from France at the end of the 19th century. The spawn was imported from France via Prussia. Before the Second World War, production was estimated at 100 tons a year. After the war, the stimuli for mushroom cultivation included the establishment of a spawn factory and the publishing of a handbook for mushroom growing. In 1960, the Horticulture Cooperative organized state controlled buying points where growers delivered their product. The farms themselves have always been private. Until 1985, practically all of the mushroom business was managed by the Horticulture Cooperative. This organization was responsible not only for the trading of mushrooms but also for organizing services, advice, endorsement of investment credit, granting of revolving credit and supporting the Mushroom Association in discussions with the Government, particularly with regard to taxation. That was very important because the mushroom growers were considered as small capitalists. In fact, good cooperation between the Cooperative and the Mushroom Association was very successful and the taxation level has never prevented the development of this branch. The export of fresh mushrooms began in 1961, first to Austria and then to former West Germany, and was supported by the Government since hard currency was highly welcome.

In 1970, Poland produced 2,000 tons of mushrooms. Ten years later this figure had risen to 22,000 tons including a 10% export level of fresh mushrooms.

In 1981, the Dutch processors discovered Poland to be a country with good quality and cheap mushrooms. The golden era for mushroom growers, Dutch processors, and particularly brokers, commenced. The export rate increased from 10% to 80% of total production. The price paid to the Polish blanching plants for the top quality-white button mushrooms was US$ 2.6 per kg and for lower quality between US$2.2 and US$1.8. The price paid to the growers was US$ 0.85.

In 1991, the harsh conditions imposed on Poland by the World Bank resulted in sharp increases in the price of energy and other commodities. The blanching business appeared to be unprofitable. Fortunately, the price of US$ 1.0-1.2 per kg, which was unacceptable for many blanching plants, has been accepted by the domestic market. The tradition of consumption and, more especially, the price

difference between meat products and mushrooms played important roles. The domestic market was considered interesting because the grower receives cash. Selling to blanching plants often required waiting for many weeks or sometimes months for payment. In a country with an inflation rate of almost 40%, this was not attractive (Swietlik, 1992).

The decreasing profitability in the last 2-3 years caused by increased production costs was evident from the drop in total production from 95,000 tons in 1990 to 65,000 tons in 1992. The reserves of cheap energy, cheap raw materials, etc. were completely exhausted. A number of growers suspended production, others used only part of their growing area (Pomiankowska, 1992).

2. STRATEGY PLAN

The Department of Edible Fungi at the Institute of Vegetable Crops in Skierniewice, in close cooperation with a group of growers, elaborated a strategy plan for the reconstruction of the Polish mushroom industry. The main features of this plan are as follows:

2.1. Strengths

+ a strong tradition in the production and consumption of mushrooms
+ abundant supplies of raw material for mushroom production
+ available energy sources (coal)
+ relatively low labour costs
+ existing growing houses with infrastructure
+ existing ' standard documentation ' for building a farm
+ a 30 year-old of tradition of exporting high quality, fresh, blanched and freshly canned mushrooms
+ close proximity to Germany, the largest mushroom importing country, and to other importing countries
+ an existing Mushroom Research Department
+ a handbook for growing mushroom under Polish conditions, and two mushroom bulletins
+ nowadays, the possibility to cooperate with western mushroom-supplying industries, and to attend international mushroom events.

2.2 Weaknesses

- relatively low yields per ton of compost
- lack of sufficient quantity of good quality compost
- seasonal production

2.3. Opportunities

* increasing domestic consumption
* an EEC import quota of 38,400 tons of mushroom per year
* increases in the yield per cycle, and in the number of cycles from 2 to 4 per year

Actually, the main reason for the poor profit was the relatively low and unstable yields, undoubtedly the result of incorrect pasteurization. However, in the simple mushroom houses, equipped with fans and a steam boiler, the growers are unable to properly fill the shelves with the

compost let alone control the whole complicated process. Nematodes are frequently found in samples of incorrectly pasteurized compost, and other important conditions are not optimized (Szudyga, 1991).

To overcome these difficulties, pasteurization needed to be done professionally. It was clear that pasteurization in tunnels was the correct way. The question now was, how to move the pasteurized compost to the small shelves on the farms without the necessity for heavy investment.

3. SOLUTION

As a solution, growing on compressed blocks was recommended (Vedder, 1978; Lelley, 1991). Since April 1992, at three locations in the the western, central and southern parts of Poland, the production of compressed blocks of spawned compost has been initiated.

4. PREPARATION OF COMPOST

Straw compost, based on rye straw and chicken manure, is used. The ingredients of the straw compost are :

1000 kg rye straw (15% moisture content)
1000 kg chicken manure litter (N-2.8%, 40% moisture)
75 kg gypsum
5000 litres water

The overall schedule for preparation is as follow:

Day minus 7 : wetting of the straw by pressing with a caterpillar in a laguna, mixing pretreated straw with chicken manure
Day minus 3 : mixing using front-loader and wetting
Day 0 : stacking the mixture in heaps 1.9 m wide and 2.2 m high
Day 3 : turning the stacks, addation of gypsum
Day 5 : turning the stacks
Day 7 : turning the stacks
Day 9 : turning the stacks and filling the tunnels

The above mixture produces, on average, 3,300 kg of compost with a moisture content of 72-74%, pH-8.2 and ammonium-nitrogen content, expressed as NH^{4+}, of 0.4% of dry matter.

The second phase of fermentation is carried out in tunnels (100 tons per tunnel). The process is computer controlled and comprises the following steps:

a) levelling the compost temperature
b) heating-up to pasteurization temperature
c) pasteurization at 57°C for 8 hours
d) cooling down to conditioning temperature
e) conditioning at 47°C
f) cooling down for spawning

It is important to emphasize that, during this process, the fresh air damper is regulated according to the optimum oxygen concentration in the circulated air. This allows for the 'breeding' of the required microflora without using steam.

Chemical analyses of the compost after pasteurization reveal the following:

(i) moisture content: 68-70%
(ii) pH: 7.5
(iii) NH^{4+}: 0.4 % based on dry matter
(iv) N-content: 2.2 % based on dry matter
(v) abundant presence of *Scytalidium thermophilum*

Pasteurized compost mixed with spawn (7 litres per ton) is pressed into a block, 0.5 x 0.4 x 0.14 m in size, and wrapped in plastic. Placed on pallets, the blocks are transported to the mushroom farms.

The size of the blocks are formed for a mushroom bed ranging from 1.2 to 1.6 m in width (recommended 1.4 m), so all existing shelves can be used without any correction and subsequent additional cost.

Immediately after collection of the required number of blocks, they are transported to the growers and there placed on the shelves as quickly as possible. The plastic on the surface of the blocks is removed and the surface then covered with paper. In autumn and winter, the compost is supplemented with Calprozyme at a concentration of 0.5%. Filling a room of 200 square metres requires 16 working hours. After 14 days of spawning, the compost is colonized and can be cased.

The casing soil is always prepared by using high peat and chalk to achieve a pH of 7.5. At present, the casing soil is prepared by the growers themselves but there is little doubt that, in the near future, professional casing soil makers will take over this role.

5. EXTENSION

Before the production of compressed blocks began in Poland, intensive training courses concerned with the technique of growing mushrooms on blocks of compost were organized. Quantities of compressed blocks were imported from Western Europe and demonstrations plots were adopted by good growers to collect information, particularly with regard to the productivity of the compost and the quality of mushroom (Saxon, 1992). The yields and the quality were surprisingly good and much better than previously achieved by the growers.

Simultaneously, training was provided on all cultivation procedures considered crucial for success including the preparation of casing soil, casing the beds, watering, ruffling, and air/compost temperature. In particular, the saturation of the casing soil and the type of ruffling required special emphasis to overcome some traditional habits of treating the mushroom beds.

Finally, it was important also to prepare the growers for the price of the blocks. It was necessary to discuss with the growers the calculation of the price because a simple comparison between the price paid previously (US$30 for one ton of green compost)] and the price of the blocks is not, of course, valid. The price of the blocks (US$77.5 per ton) includes the cost of the spawn, compost lost during the pasteurization (27 %), heating, labour costs for filling the green compost, spawning and tamping. Additionally, it was explained that if pasteurization ceased, the building would not be damaged.

Unfortunately, 27% of the price quoted above goes on banking costs. No aid is granted to the growers. It was only possible for private investors to bear the whole financial burden of the venture by significantly increasing yields. As a result of careful preparations made beforehand, the initial results have already been seen after only a few weeks of project implementation. The average yield has increased from 15 kg to 25 kg per square metre and the variable production cost per kg of mushroom decreased from US$ 0.71 to US$ 0.42 (calculated on the basis of the price of compressed compost). Since other costs (fixed assets, labour, general expenses) are not so important on a small

family farm, this decrease in variable production costs leads to increased profitability and provides a much needed boost to mushroom production.

This example illustrates the impact that investment can have when directed at a crucial link in the overall process. Investing US$700,000 in a mushroom producing region with existing infrastructure has created additional mushroom production valued at US$9,000,000.

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