

Bedding material for poultry and other small animals

This invention relates to bedding material for poultry and other animals.

Shredded paper, particularly shredded newsprint, has been used successfully as a bedding material for 5 ruminant farm animals such as cattle. Such material has proved to be an extremely effective and non-toxic substitute for straw.

The use of shredded newspapers as bedding for small intensively reared animals such as poultry being 10 reared for the broiler market has, however, been less satisfactory. The shreds of paper will have a length approximating to the width of a folded newspaper page (approximately 300-400 mm). Because of their length, the shreds tend to become entangled and matted with 15 excrement, so that after a period of intensive use the bedding becomes caked. When caked, the bedding is virtually a continuous mass which does not bio-degrade effectively, and which can give rise to poultry rash. Furthermore, the cleaning of the area of use, for 20 example a broiler-house, becomes very laborious because the caked paper shreds are very slippery.

The present invention aims to solve this problem very simply by providing a bedding material based on absorbent non-toxic paper which is not prone to 25 become entangled and matted during prolonged use with small intensively reared animals.

According to the present invention there is provided a bedding material for poultry and other animals comprising a mixture of shreds of absorbent non-toxic paper of at least two different sizes, each shred comprising a strip having a width of the order of 10-40 mm and lengths between 5 mm and 120 mm, the said mixture including a sufficient proportion of strips which are sufficiently short to be uncongealed after a prolonged period of use.

10 The non-toxic paper is preferably newsprint, for example old newspapers. The strips may be formed by a two-stage process whereby the sheets of paper are first shredded into long strips and then the strips are subdivided into short strips or particles of a
15 desired length. The product may, for example, be made by passing sheets of absorbent paper through a shredding unit two or more times so as first to shred the paper and then to subdivide the shreds.

 The paper strips used for the bedding material
20 may be in the form of diced pieces or strips at least some of which have a length substantially equal to their width, although short rectangular strips may also be used.

 The "diced" paper bedding may be made by passing
25 sheets of absorbent paper such as old newspapers through a multiple high speed shredding unit which subdivides the paper into strips, and then feeding the strips thus

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formed through the shredding unit a second time, or into a separate high speed cutting machine which cuts the strips transversely of their length. The cutting machine may take various forms, but a suitable high speed cutter may employ multiple cutter blades mounted on a rotor and cooperating with a fixed blade to cut the shreds of paper transversely by a shearing action, in a manner analogous to the action of a rotary cylinder lawn mower.

10 The effectiveness of the bedding material, and in particular its resistance to caking during use, it critically dependent upon the nature of the paper employed. In practice it is found that bedding material made exclusively from absorbent paper such as newsprint tends to become congealed too quickly, particularly in relation to the period of continuous use (approximately fifty days) to which the material is subjected when employed for the intensive rearing of broiler hens. To improve the characteristics of the bedding material it is preferable to admix with the absorbent paper a proportion of relatively non-absorbent and non-toxic paper and/or cardboard. Certain glossy papers as used for magazines may be suitable for this purpose.

25 The bedding material of the present invention may be produced by means of a paper cutting machine comprising a rotor having a plurality of blade elements with part-cylindrical surfaces defining cutting edges lying on a common cylindrical surface coaxial with the axis of rotation of the rotor, each cutting edge being inclined at a constant angle to generatrices of the said cylindrical surface, a fixed rigid bar having a substantially flat

paper feed surface bounded by a shearing edge parallel to the axis of rotation of the rotor, means for coupling a driving torque to the rotor, and means for adjusting the relative position of the rotor axis and the said
5 shearing edge so that the cutting edges of the rotor and fixed bar cooperate to shear sheets of paper fed over the fixed bar towards the rotor.

By controlling the speed of rotation of the rotor in relation to the rate of feed of the paper it is
10 possible to regulate the size of the paper shreds or "diced" paper produced by the machine.

To facilitate the changing and grinding of the individual blade elements each blade element may be releasably bolted to the rotor. The blade elements
15 are preferably supported at opposite ends by support plates mounted upon a shaft of the rotor. The rotor shaft may have a square cross section and a width of substantially the same order as the circumferential width of the blade elements.

20 Each blade element preferably has a part-cylindrical surface coinciding with the said common cylindrical surface of the rotor and bounded by the cutting edge of the blade element. Thus each blade element may have a substantially rectangular base portion surmounted
25 by a wedge-shaped head portion one edge of which forms the cutting edge of the blade, the face of the head portion remote from the base portion being the part-

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cylindrical surface which defines the said cutting edge. The heavy duty construction of the blade elements enables the rotor to accept a high throughput of paper, particularly shredded paper, to be chopped
5 into small pieces.

Sheets or shreds of paper to be cut may be fed to the rotor by a pair of pinch rollers arranged with their axes parallel to the axis of the rotor, one or both of the rollers being power-driven. Preferably,
10 however, the paper cutting machine of the present invention is arranged immediately downstream of a shredding unit for shredding sheets of paper in which case the shredding unit itself may act as a self-regulating means for feeding shreds of paper

to the cutting machine to produce diced paper by chopping the shreds into short lengths. The resulting short lengths of paper may typically be of square shape with a length and width between 10 and 20 mm. The paper to be shredded and subsequently cut into short lengths may be absorbent paper such as newspaper, or a mixture of newspaper and less absorbent paper.

A paper cutting machine for the production of the animal bedding material is illustrated, by way of example only, in the accompanying purely diagrammatic drawings, in which:

Figure 1 is a partial perspective view illustrating part of a rotor and fixed stator bar of the paper cutting machine;

15 Figure 2 is a partly broken away front elevational view of the paper cutting machine, and

Figure 3 is an end elevational view of the machine shown in Figure 2, including an associated shredding unit.

The illustrated paper cutting machine has a rigid supporting frame structure 1 (Figure 2) which supports a square section fixed stator bar 2. The frame 1 supports a rotor 3 for rotation about an axis parallel to the stator bar 2, the rotor 3 having a plurality of blade elements 4 which have cutting edges 5 lying on a common cylindrical surface coaxial with the axis of rotation of the rotor, each

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cutting edge 5 being inclined at a constant angle to generatrices of the said cylindrical surface, the cutting edges cooperating with a static cutting edge 6 of the stator bar 2 to define multiple shearing edges for cutting paper sheets or shreds fed to the machine over the stator bar 2 .

Paper to be comminuted is fed to the machine between a pair of pinch rollers 7 (Figure 3) arranged with their axes parallel to the axis of rotation of the rotor 3, one or both of the pinch rollers 7 being driven. The pinch rollers 7 may in practice be dispensed with as explained later.

The rotor 3 has a square-section shaft 8 with a width substantially equal to the circumferential width of each blade element 4. On the shaft 8 there are mounted a number of profiled support plates 9 to which the blade elements 4 are releasably fixed by means of bolts (not shown). Alternatively, the blade elements 4 in each axial section of the rotor 3 may be keyed or welded to the support plates 9 to form a rigid rotor structure.

Each blade element 4 is manufactured from a solid steel block and has a substantially rectangular base portion 10 surmounted by a wedge-shaped head portion 11 one edge of which forms the cutting edge 5 of the blade, the face of the head portion 11 remote from the base portion being a part cylindrical surface 12, bounded by the said cutting edge 5.

which lies in the said cylindrical surface of rotation of the rotor 3.

Means are provided for adjusting the relative position of the rotor axis and the cutting edge of the stator bar 2. In the illustrated example this means takes the form of adjustable bearings for the rotor shaft 8, one such bearing being shown diagrammatically in Figure 3 and indicated by reference numeral 14. The adjustable bearing 14 includes a screw member 15 engaging the frame structure by means of which a supported end journal 16 of the shaft 8 may be adjusted linearly towards or away from the stator bar 2 to bring the cutting edges of the stator bar 2 and the blade elements 4 into cooperation with each other to effect shearing.

In the illustrated embodiment the blade elements 4 are of limited length, for convenience of construction, and are arranged in adjacent axial sections of the rotor each comprising four blade elements equiangularly spaced. The blade elements in adjoining axial sections are staggered circumferentially relative to each other. Where the rotor has a substantial axial length, as in the illustrated embodiment, the blade elements may be divided into two or more separate sections between which the rotor shaft 6 is supported by a bearing, to prevent undue flexing or "whipping" of the rotor shaft. Thus as shown each end portion of the rotor shaft (Figure 2) is provided with a cylindrical cross section and is supported by

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bearings 14 each of which has a screw-adjustment facility as illustrated in Figure 3. In the illustrated embodiment the rotor shaft 6 is in two sections which are interconnected by a flexible drive-transmitting coupling 18. The rotor is driven from a suitably rated heavy duty electric motor (not shown) through a drive sprocket 19 at one end of the rotor shaft 6 externally of the supporting frame 1. Drive for the pinch rollers 7, 8 may be taken from a drive sprocket 20 keyed onto the rotor shaft 6.

It will be appreciated that in practice the number and grouping of the blade elements 4 along the rotor shaft 8 will be selected according to the overall length of the shaft 8 in relation to the axial extent of the blade elements 4.

The paper fed to the machine may be in the form of sheets, in which case the sheets will be subdivided into strips by the action of the rotary cutter. These strips may then be fed through the machine again, to be subdivided into short pieces, the resulting diced paper being suitable for use as animal bedding or litter.

Preferably, as illustrated diagrammatically in Figure 3, the cutting machine is fed with shredded paper produced by a high speed shredding unit 21, shown diagrammatically and not to scale in Figure 3. The shredding unit 21 has intermeshing rotary discs which shred the paper into strips which are fed directly to

the cutting machine, where the shreds are chopped into short strips or pieces by the rotary cutter as the shreds pass over the stator bar 2. A conveyor or chute 22 may be arranged to convey the shreds of paper from the shredding unit 21 to the cutting machine.

The conveyor or chute 22 and the pinch rollers 7 shown in Figure 3 may in practice be dispensed with by placing the shredding unit 21 sufficiently close to the cutting machine to feed shreds directly to the rotor 3. Jamming of the feed to the cutter rotor can be avoided by operating the rotary discs of the shredding unit at a slower speed than the rotor 3 of the cutting machine. In effect, the rotary discs of the shredding unit act as pinch rollers feeding the shredded paper to the cutting machine.

The resulting comminuted or diced paper, consisting of short strips, ideally square in shape, should typically measure about 10-40 mm in width and 5-120 mm in length. The diced paper has been found to have ideal properties as a bedding material or litter for intensively reared small animals such as poultry. The material is less prone to becoming matted or congealed after prolonged use than conventional shredded newsprint. Moreover, the shorter length of the paper strips compared with conventional shredded newsprint enables the material to be spread more evenly and economically as animal bedding or litter. The ideal amount of diced paper to

be spread on an animal bedding area will vary according to prevailing climatic conditions, but will generally be less than the amount of conventionally shredded paper which would be required in a given situation.

5 It has been found that particularly good results can be obtained by using animal bedding according to the invention made up of comminuted or diced paper strips of different randomly distributed lengths, typically ranging from 5 mm to 120 mm. Such a size distribution
10 of the length of the chopped paper shreds can be achieved by employing cutter blade elements 4 on each section of the rotor 3 which have different clearances between their cutting edges 5 and the cutting edge 6 of the stator bar 2: suitable clearances would typically
15 range from 0 to 0.25 (10^{-3} inch). Thus the four cutter blade elements 4 on a section of the rotor 3 may have predetermined clearances from the cutting edge 6 of the stator bar 2 of substantially zero, 0.08 mm, 0.16 mm and 0.25 mm respectively. With such a rotor the
20 resulting paper strips will have different lengths between 5 mm and 120 mm, with about 25% of the strips having a length between 100 mm and 120 mm. This product has proved to be ideally suited as bedding for broiler hens.

25 When the bedding material according to the invention has been used and has become impregnated with animal manure, it may be collected, partially dried, and used

as a convenient fertilizer, particularly if the bedding is used for poultry, which produce protein-rich manure. The collected soiled bedding may be minced or pelletised in a process which reduces the moisture content to a controlled level, preferably 12% moisture by weight. The partially dried material may alternatively be broken up into particles or granules. For use as a nutrient material, for example as a feedstock base, the impregnated bedding may be admixed prior to pelletisation with fishmeal. For use as a fertilizer the bedding material may be mixed with superphosphate before pelletisation.

According therefore to another aspect the present invention provides a nutrient material or fertilizer comprising particles or pellets of paper, with a controlled moisture content, impregnated with animal manure and produced from used bedding material of the kind herein described.



CLAIMS

1. Bedding material for poultry and other animals, comprising a mixture of shreds of absorbent non-toxic paper of at least two different sizes, each shred comprising a strip having a width of the order of 10-40 mm and lengths between 5 mm and 120 mm, the said mixture including a sufficient proportion of strips which are sufficiently short to be uncongealed after a prolonged period of use.
2. Bedding material according to Claim 1, in which at least some of the paper strips have a length substantially equal to their width.
3. Bedding material according to Claim 1 or Claim 2, in which the paper strips have different lengths randomly distributed.
4. Bedding material according to Claim 1, in which substantially 25% of the paper strips have lengths between 100 mm and 120 mm.
5. Bedding material according to any one of Claims 1 to 4, in which the absorbent paper strips are admixed with a proportion of relatively non-absorbent non-toxic paper and/or cardboard.



6. Nutrient material or fertilizer comprising particles or pellets of paper, impregnated with animal manure and produced from used animal bedding material according to any of Claims 1 to 5, in a process which reduces the moisture content of the material.

7. Nutrient material or fertilizer according to Claim 6 in which the particles or pellets are impregnated with a mixture of chicken manure and super-phosphate.

8. Nutrient material or fertilizer according to Claim 6 in which the particles or pellets are impregnated with a mixture of animal manure and fishmeal.

9. Nutrient or fertilizer material according to any of Claims 6 to 8, in which the particles or pellets have a moisture content of substantially 12% moisture by weight.

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