

# Types of chaff cutter

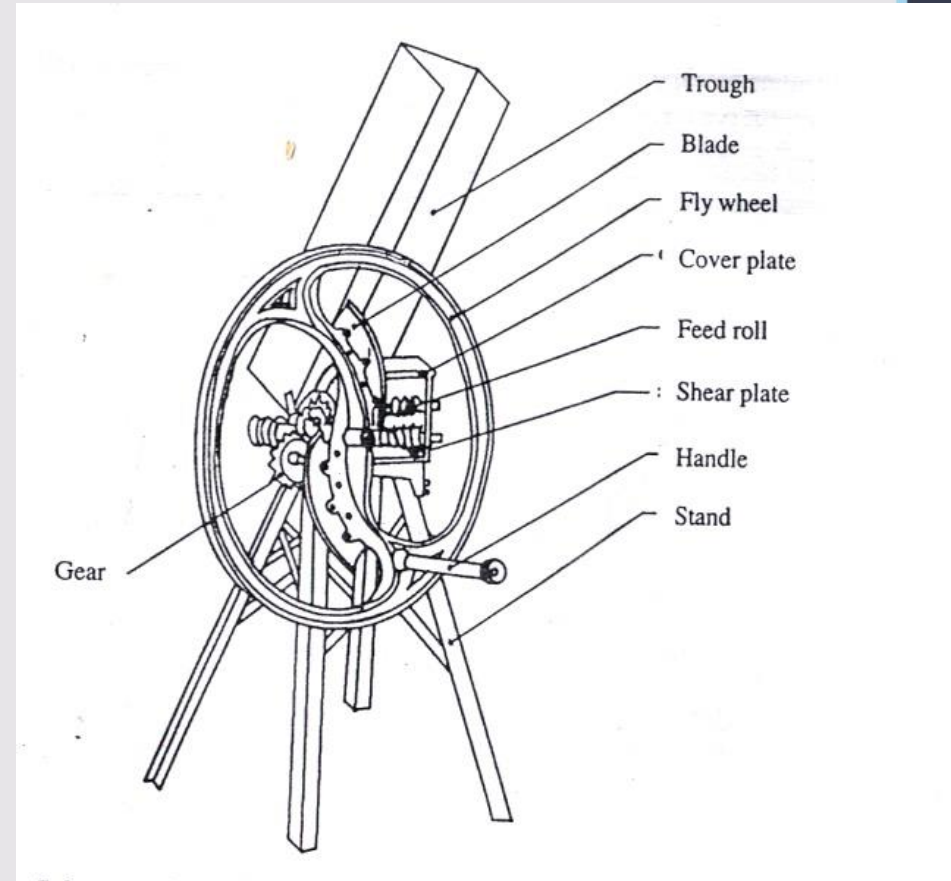


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**Manually  
operated  
Flywheel type**

**Power  
operated  
Flywheel type  
Cylinder type**





# MANUAL CHAFF CUTTER

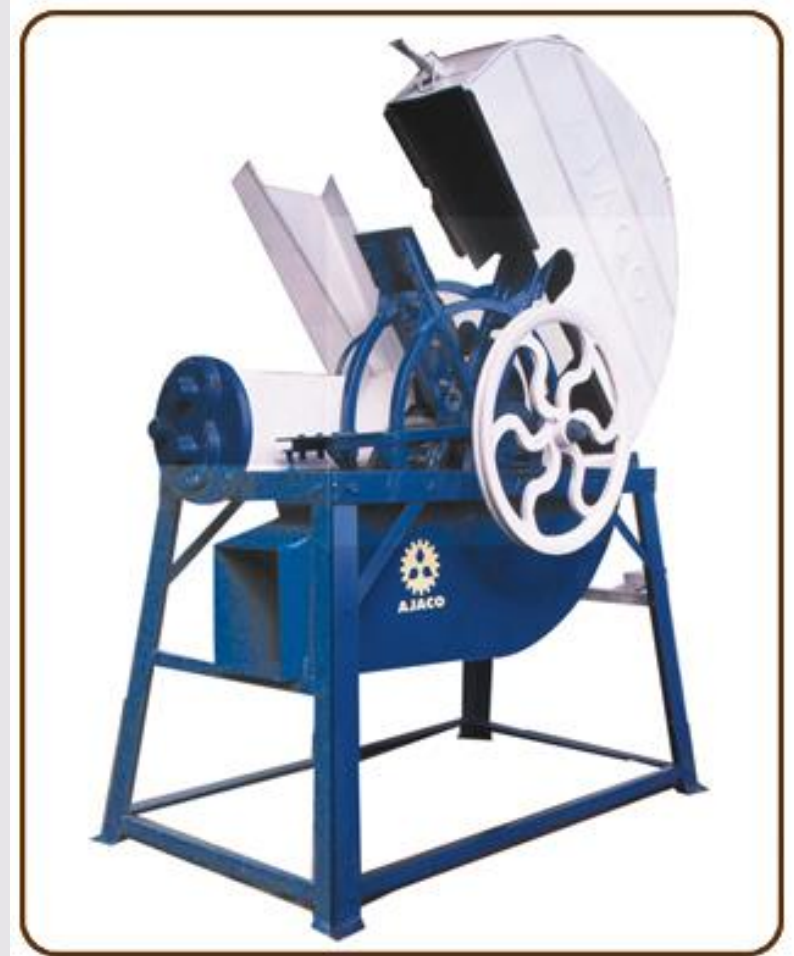




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# POWER OPERATED CHAFF CUTTER



# COMPONENTS OF MANUAL CHAFF CUTTER



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Feeding trough

Feed rollers

Fly wheel

Cutting blade

Shear plate

Handle





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# Feed mechanism

**Two feed rollers**

**Upper roller**

**Has transverse ribs, provides max. holding of the straw or green fodder**

**Lower roller**

**Smooth/with ribs**

**Provides positive feeding**

**Rollers have small diameters**

**Rollers close to the cutting plane so that long pieces not pulled by the knife**

**Peripheral speed of the rollers and conveyor or apron should be same for positive feeding**

**Upper feed roller is spring loaded to accommodate varying layer of material**



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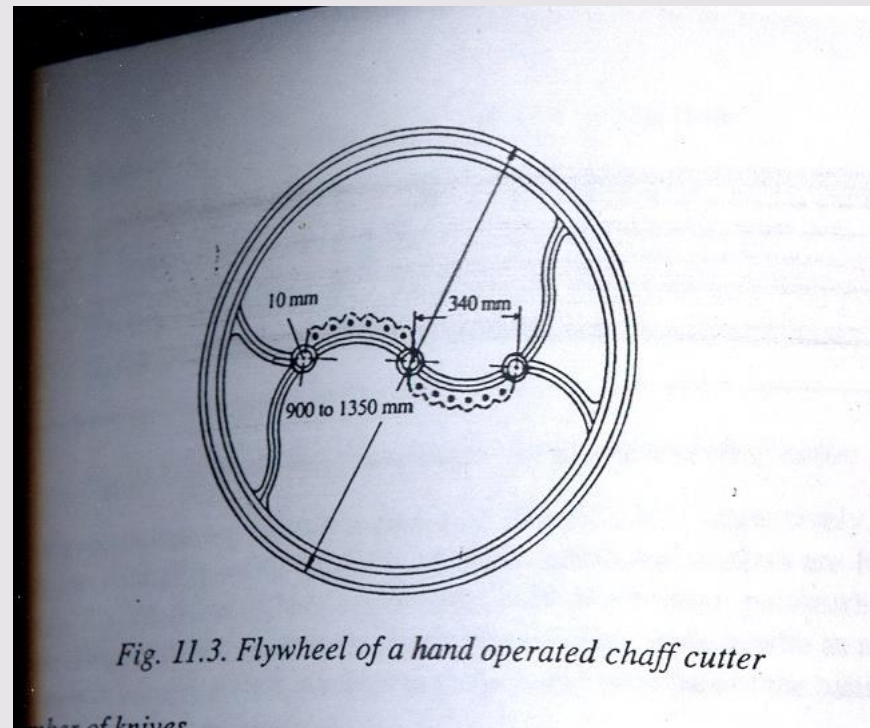
# Chopping

**Two types of Cutter head: Flywheel type & cylinder cutter head**

**Cutting is progressive from one end to other to minimize peak torque**

**Fly wheel cutter head**

**1- 2 knives**



# Operating speed for cutter head of power operated chaff cutter

<b>Size of fly wheel, mm</b>	<b>Operating speed, rpm</b>	
	<b>Fly wheel cutter head</b>	<b>Cylinder cutter head</b>
<b>330</b>	<b>540-675</b>	
<b>355</b>	<b>400-625</b>	
<b>381</b>	<b>475-580</b>	
<b>406</b>	<b>440-550</b>	
<b>3 knife cutter head</b>		<b>500-600</b>
<b>4 knife cutter head</b>		<b>400-500</b>



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# LENGTH OF CUT

**Defined as amount of advance of the feed mechanism between cuts of two successive knives**

**Length of cut depends on**

**Change of speed of feed roller (2-3 speed gear box for power operated, and 2 speeds worm gears for hand operated chaff cutter)**

**No. of knives**

**In hand operated one: two knives for shorter cut and one knife for longer cut**

**Changing the speed of cutter head**

**Max length 25 - 90 mm, min: 3- 6 mm**

**Green fodder: 40 mm**

**Longer length of cut desirable for palatability**

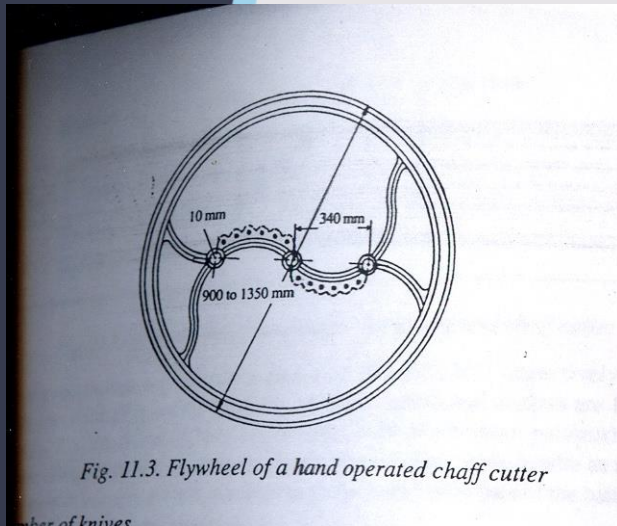




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# SHAPE OF KNIFE



The outer edge of the knife is designed with logarithm spiral equation

$$R = ae^{b\theta}$$

Where,  $\theta$  varies from 360 to 540 degree



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# Power requirement of chaff cutter

Power requirement consists of

- Loss of power in bearing
- Rubbing of knives on shear plate
- Operation of feeding mechanism
- Chopping/ cutting fodder
- Accelerating the cut material

**Power**

3% for shearing of stems

35% for chopping

50% or more for feeding & accelerating

Feeding & accelerating power increases exponentially with speed of rotation

**Chopping and cutting force =  $a_0 * n * \sigma$**

**$a_0$  = cross sectional area of the stem**

**$n_s$  = no of stems accommodated in the throat**

**$\sigma$  = dynamic shear stress of material**



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# Capacity of the chaff cutter

$$Q = D * L * W * H * n * N * C$$

Where

C = constant = 60

D = bulk density of fodder, kg/m<sup>3</sup>

W = width of the throat, m

H = height of the throat, m

L = length of cut, m

n = no. of knives

N = RPM of the knives