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Growth Rate in Cattle

Growth Rate

The growth rate in cattle refers to the speed at which cattle gain weight over a specific period. It is typically measured in terms of average daily gain (ADG), which is the weight gained per day. A higher growth rate indicates efficient feed conversion and better productivity, which is vital for both beef and dairy operations.

Factors Affecting Growth Rate:

Several factors influence the growth rate of cattle:

1. **Genetics:**

- Genetic makeup determines the potential for growth.
- Breeds like Angus, Charolais, and Limousin are known for faster growth rates.
- Genetic selection programs focus on traits like growth, feed efficiency, and disease resistance.

2. **Nutrition:**

- Proper nutrition is essential for optimal growth.
- Protein, energy, vitamins, and minerals must be balanced.
- Quality forage, grains, and supplements are key components of cattle diets.
- Nutritional deficiencies can severely hamper growth rates.

3. **Health and Disease Management:**

- Parasites and diseases can reduce growth rates significantly.
- Vaccination and regular health check-ups are crucial.
- Stress management (e.g., minimizing transportation stress) also impacts growth.

4. **Environmental Conditions:**

- Temperature, humidity, and housing conditions play a role.
- Extreme weather conditions may decrease feed intake and slow growth.
- Providing shelter and adequate water sources is essential.

5. **Management Practices:**

- Regular monitoring and weighing help track growth progress.
- Early weaning and creep feeding can accelerate growth in calves.
- Proper stocking density reduces competition for resources.

Phases of Growth

Cattle growth can be divided into three main phases:

1. **Pre-weaning Phase:**

- The fastest growth occurs during the first few months.
- Milk or milk replacers, along with starter feeds, are crucial.

2. **Post-weaning Phase:**

- Growth slows but remains significant.
- High-quality forage and balanced concentrate diets are important.

3. **Finishing Phase:**

- Focuses on achieving market weight.
- Energy-dense diets optimize weight gain and carcass quality.

Improving Growth Rate

Farmers can adopt various strategies to enhance growth rates:

- Implement genetic improvement programs.
- Optimize feeding programs based on cattle age and growth phase.
- Maintain a strict health and vaccination schedule.
- Provide comfortable living conditions and reduce stress factors.
- Utilize growth-promoting technologies like implants or feed additives responsibly, where legal and ethical.

Methods for Measuring Growth Rate

1. **Regular Weighing**

- **Frequency:** Weigh cattle at regular intervals, such as biweekly or monthly, to track weight changes.
- **Tools:**
    - **Mechanical scales:** Traditional but reliable.
    - **Digital scales:** Provide accurate and quick measurements, often integrated with farm management software.

2. **Average Daily Gain (ADG) Average total Gain (ATG) Calculation**

- **Formula:** ATG=Final Weight - Initial Weight

ADG= Final Weight - Initial Weight /Number of Days

- This metric provides a straightforward assessment of how efficiently cattle are gaining weight.

Example: A calf weighed 350 kg at the beginning of the experiment, and after 90 days its weight became 500 kg. What is the growth rate?

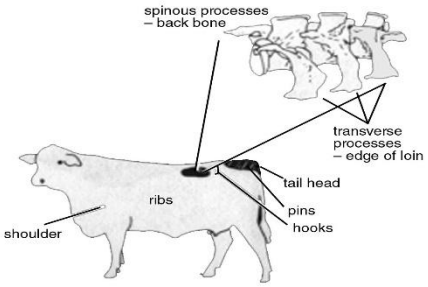
ATG=Final Weight - Initial Weight

ATG= 500-350 = 150kg

ADG= Final Weight - Initial Weight /Number of Days

ADG= 500-350/90 = 1.66kg

3. **Body Condition Scoring (BCS)**



- **Purpose:** Evaluates the animal's fat reserves and overall health.
- **Scale:** Usually ranges from **1 (emaciated)** to **9 (obese)** for beef cattle.
- **Applications:**
    - Ensure cattle maintain optimal BCS during growth phases.
    - Adjust feeding if scores deviate from the desired range.

4. **Hip Height and Frame Score**

- **Measurement:** Use a measuring stick to assess hip height, which correlates with skeletal growth.
- **Frame Score:** Determines potential mature size and expected growth rate based on age and height.

	Frame Score								
Age in Months	1	2	3	4	5	6	7	8	9
5	33.5	35.5	37.5	39.5	41.6	43.6	45.6	47.7	49.7
6	34.8	36.8	38.8	40.8	42.9	44.9	46.9	48.9	51.0
7	36.0	38.0	40.0	42.1	44.1	46.1	48.1	50.1	52.2
8	37.2	39.2	41.2	43.2	45.2	47.2	49.3	51.3	53.3
9	38.2	40.2	42.3	44.3	46.3	48.3	50.3	52.3	54.3
10	39.2	41.2	43.3	45.3	47.3	49.3	51.3	53.3	55.3
11	40.2	42.2	44.2	46.2	48.2	50.2	52.2	54.2	56.2
12	41.0	43.0	45.0	47.0	49.0	51.0	53.0	55.0	57.0
13	41.8	43.8	45.8	47.8	49.8	51.8	53.8	55.8	57.7
14	42.5	44.5	46.5	48.5	50.4	52.1	54.4	56.4	58.4
15	43.1	45.1	47.1	49.1	51.1	53.0	55.0	57.0	59.0
16	43.6	45.6	47.6	49.6	51.6	53.6	55.6	57.5	59.5
17	44.1	46.1	48.1	50.1	52.0	54.0	56.0	58.0	60.0
18	44.5	46.5	48.5	50.5	52.4	54.4	56.4	58.4	60.3

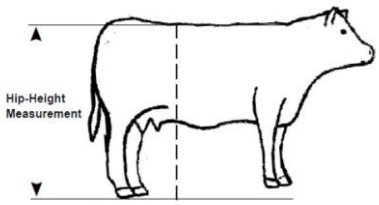


Figure 1. Hip height diagram.

5. **Slaughtering method**

- It is considered one of the most accurate methods, so it is used in scientific research.
- One of its advantages is that it gives a clear and accurate idea of the growth rate of each tissue in the body, individually.
- However, this method is criticized for being expensive, as the animal is slaughtered in it.

6. **Growth Charts and Records**

- Compare individual growth against breed-specific standards and historical records.
- Use visual tools like growth curves to monitor progress over time.

Example Growth Monitoring Program

Age (Months)	Target Weight (kg)	ADG (kg/day)	BCS Target	Measurement Tool
1	80-100	0.8-1.0	5-6	Scale
6	200-250	1.0-1.2	5-6	Scale, BCS, Height
12	350-400	1.2	5-6	Scale, Frame Score
18	500-600	1.0-1.1	5-6	Scale, RFID

Methods of measuring livestock weight:

1. **Using a Measuring Tape (Standard Formula):**

Required Tools:

- A flexible measuring tape.

Steps:

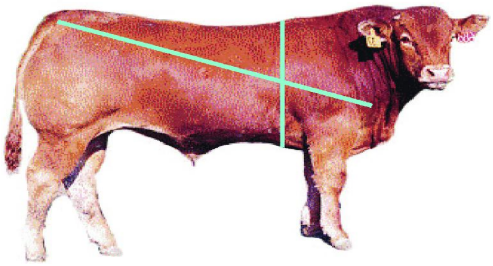
a) **Measure the Heart Girth:**

- Wrap the measuring tape around the chest of the cow, just behind the front legs.
- Ensure the tape is snug but not too tight and is level.
- Record the measurement in centimeters (or inches).

b) **Measure the Body Length:**

- Measure the distance from the point of the shoulder to the base of the tail.
- Record the measurement in centimeters (or inches).

c) **Apply the Formula:**



$$\text{Weight (kg)} = \frac{Heart\ Girth^2 \times Body\ Length}{10800}$$

For measurements in inches, the formula is:

$$\text{Weight (lbs)} = \frac{Heart\ Girth^2 \times Body\ Length}{300}$$

Example:

- Heart Girth = 190 cm, Body Length = 150 cm.

$$\text{Weight} = \frac{190^2 \times 150}{10800} \approx 500\text{kg}$$

2. Using Weight Charts:

Required Tools:

- A measuring tape.
- A weight chart specific to the cattle breed.

Steps:

1. Measure the heart girth as in method 1.
2. Cross-reference the measurement with the appropriate weight chart.
   - Charts are typically available online or in livestock management guides.

Table 1. Body weights and dimensions with manual measurement and image processing

Number	Cows body weight (kg)	Body Length (cm)		Chest Circumference (cm)		Hip Height (cm)		Hump Height (cm)	
		Tape based	Image based	Tape based	Image based	Tape based	Image based	Tape based	Image based
1	207.5	107	95	142	128	119.0	101	125.0	96
2	162.5	95	90	134	130	114.5	97	120.0	90
3	204.0	111	107	145	148	121.0	107	128.5	103
4	315.0	131	102	171	164	125.0	110	128.0	109
5	348.0	133	107	172	176	131.0	106	130.0	110
6	170.5	108	91	133	133	116.5	104	123.5	105
7	174.0	100	89	138	131	119.0	100	123.0	99
8	236.0	120	110	151	145	123.0	117	127.0	114
9	256.0	127	114	151	151	126.0	122	129.0	117
10	148.5	108	92	132	130	119.0	113	123.0	110
11	294.5	125	123	157	153	131.0	133	127.0	127
12	341.0	133	118	168	168	132.0	126	134.0	124
13	241.0	122	115	153	143	129.0	118	127.0	112
14	255.5	113	115	151	142	125.0	122	121.0	112
15	221.5	118	113	148	141	127.0	127	125.0	119
16	256.0	118	112	152	147	128.0	120	125.0	117
17	309.5	120	109	156	146	127.0	113	123.0	106
18	178.5	100	99	137	132	122.0	115	119.0	108
19	232.5	124	109	152	144	130.0	124	126.0	120
20	275.0	125	105	164	148	124.0	112	128.0	113
21	217.0	113	103	149	142	128.0	113	121.0	109
22	180.0	108	105	134	132	121.0	120	121.0	111
23	211.0	115	111	145	137	128.0	119	121.0	110
24	186.5	112	105	143	136	128.0	113	126.0	105

3. Using a Livestock Scale:

Required Tools:

- A specialized livestock scale.

Steps:

1. Gently guide the cow onto the scale.
2. Ensure the cow is standing still and balanced.
3. Record the weight displayed on the scale.

4. Using Digital Apps or Calculators:

Required Tools:

- A smartphone or tablet.

Steps:

1. Download a livestock weight calculator app (e.g., "Cattle Weight Calculator").
2. Input the heart girth and body length into the app.
3. View the estimated weight result.