***Principles of Alimentary Tract Dysfunction***

* The primary functions of the alimentary tract are the prehension, digestion and absorption of food and water and the maintenance of the internal environment.
* there are four major modes of alimentary dysfunction:

abnormality **of motility, secretion, digestion or absorption.**

**A-Motor Function (motility):**

Slow waves are constantly propagated from the stomach to the rectum. stimulation via the sympathetic and parasympathetic nervous systems by The spiking activity, also known as the migrating myoelectric complex

1. ***The quiet phase*,** in which very little spike activity occurs in empty
2. ***The irregular phase,*** characterized by intermittent spike activity to mix injesta
3. ***The activity front,*** characterized by intense, continuous spike activity. To forwarded

**gastrointestinal tract motility can Disrupted by**:

1- Hypermotility ⇧ or hypomotility⇩

2- Distension of segments of the tract

3- Abdominal pain

4- Dehydration and shock

**B- Secretory Function:**

Diseases in which abnormalities of secretion occur are not generally recognized in farm animals. some neonates may be deficient in lactase activity, which results in dietetic diarrhea .

**C- Digestive Function :**

* + The ability of the alimentary tract to digest food depends on its motor and secretory functions.
	+ in herbivores, digestion depend on the activity of the microflora that inhabits the forestomachs of ruminants or cecum and colon of equidae. digesting cellulose, of fermenting the end-products of other carbohydrates to volatile fatty acids and converting nitrogenous substances to ammonia and protein.

**D- Absorptive Function :**

Absorption of fluids and the dissolved end-products of digestion may be affected by ⇧ motility or disease of the intestinal mucosa as , lesions ,and helminth infestations.

# *Manifestations (sings) of Alimentary Tract Dysfunction :*

* 1. **1-Inanition** (emaciation and depression….) is the major physiological effect of alimentary dysfunction when the disease is a **chronic one**, 2-**dehydration** is the major effect in **acute** diseases, **3-shock** in **hyperacute** diseases, **4-abdominal pain** , **5-vomiting , 6-diarrhea , 7-constipation , 8-hemorrhage** and **9-scant feces** , Other abnormalities in **10-prehension , 11-mastication , and 12-swallowing .**
	2. **A - abnormalities of Prehension, Mastication and Swallowing :**
	3. **Prehension**

is the act of grasping for food with the mouth (lips, tongue, teeth). It includes the ability to drink.

**Causes of faulty prehension include:** the animal is hungry and attempts to feed but cannot do so

* + 1. Paralysis of the muscles of the jaw or tongue .
		2. Malapposition of incisor teeth due to: 1- inherited skeletal defect (displaced molar teeth, prognathism, congenital osteopetrosis), 2- rickets
		3. Absence of some incisor teeth
		4. Pain in the mouth due to stomatitis, glossitis, foreign body in mouth, decayed teeth, e.g. fluorosis
		5. Congenital abnormalities of tongue and lips: inherited harelip, inherited smooth tongue of cattle.
	1. **Mastication**

may be painful and is manifested by slow jaw movements interrupted by pauses and expressions of pain , undigested material in the feces if the cause is a **bad tooth**, but in a **painful stomatitis** there is usually complete refusal to chew , dropping of food from the mouth .

**3) Swallowing**

A defect in nervous control- vagal nerves .**Dysphagia** is manifested by forceful attempts to swallow accompanied initially by extension of the head, followed by forceful flexion and violent contractions of the muscles of the neck and abdomen.

**causes of dysphagia and inability to swallow**:

 a- Foreign body.

1. Tumor or inflammatory swelling in pharynx or esophagus.
2. Painful condition of pharynx or esophagus.
3. Esophageal dilatation due to paralysis.
4. Esophageal diverticulum.

Esophageal spasm at site of mucosal erosion (achalasia of cardia not encountered).

*(Lesions in the* ***pharynx*** *cause regurgitation through the nostrils or coughing up of the material, the* ***esophagus*** *swallowed and then regurgitated, material regurgitated alkaline, while vomitus acid)*

# Drooling of Saliva and Excessive Salivation :

* 1. Drooling saliva from the mouth, distinct from frothing such as occurs during convulsions, may be caused by pain in the mouth and by an inability to swallow.
	2. Excessive salivation is caused by stimulation of saliva production by systemic toxins, especially fungal toxins, or by hyperthermia.
	3. **B - Vomiting and Regurgitation :**

**Vomiting:** is the forceful ejection of contents of the stomach and the proximal small intestine through the mouth and is a motor disturbance of the alimentary tract. It is a vigorously active motion signaled by hypersalivation, retching and forceful contractions of the abdominal muscles and diaphragm. It occurs in two forms:

* 1. **Projectile vomiting:**

This is not accompanied by retching movements and large amounts of fluid material are ejected with little effort. It is almost always as a result of **overloading** of the stomach or forestomach with feed or fluid.

* 1. **True vomiting**

it occurs in monogastric animals like the dog and cat, true vomiting is accompanied by retching movements including contraction of the abdominal wall and of the neck muscles and extension of the head.

True vomiting is rare in farm animals.

True vomiting is not a feature of gastric disease in the *horse* for two reasons,

 first\\ the strong cardiac sphincter inhibits the release of stomach contents,

 second\\ the soft palate and epiglottis combine to effect a seal between the oral and nasal parts of the pharynx so that any vomited stomach contents must be discharged through the nasal cavities and not through the mouth.

**Regurgitation**: is the expulsion through the mouth or nasal cavities of feed, saliva and other substances that have not yet reached the stomach.

* Ruminants regurgitate rumen contents as part of rumination but the material is not expelled from the mouth nor into the nasal cavities.

**Causes of vomiting include:**

* + 1. Terminal vomiting in horses with acute gastric dilatation
		2. third-stage milk fever (loss of tone in the cardia)
		3. arsenic poisoning (acute inflammation of the cardia)
		4. poisoning by plants including Eupatorium rugosum, Geigeria spp., Hymenoxis spp., Andromeda spp., Oleander spp., Conium maculatum
		5. veterinary administration of large quantities of fluids into the rumen (regurgitation occurs while the stomach tube is in place)
		6. use of a large-bore stomach tube
		7. cud-dropping: a special case of regurgitation usually associated with abnormality of the cardia
		8. all diseases causing dysphagia or paralysis of swallowing may Cause of regurgitation

**C- Diarrhea, Constipation and Scant Feces** :

|  |  |
| --- | --- |
| **Diarrhea** | **Constipation** |
| ⇧Increased motility causes diarrhea * Inflammation of GIT, such as occurs in mild gastritis and enteritis, may result in an increase in muscular activity
 | ⇩decreased motility causes constipation* weakness of the musculature, or severe inflammation such as acute peritonitis or after trauma, or infarction, results in atony of the intestinal wall
 |
| ⇧increased frequency of defecation accompanied by feces that contain an ⇧increased concentration of water and ⇩decrease in dry matter content.( the feces varies from soft to liquid) | ⇩decreased frequency of defecation accompanied by feces that contain ⇩ a decreased concentration of water.( The feces vary in consistency from being hard to dry and of small bulk.) |
|  | time is prolonged fluid absorption **scant feces** occurs |

**Diarrhea:**

**Common causes of diarrhea are:**

* + - 1. **Enteritis**, including secretory enteropathy
			2. **Malabsorption**, e.g. due to villous atrophy and in hypocuprosis ⇩Cu (due to molybdenum excess)
			3. **Neurogenic diarrhea** as in excitement
			4. **Local lesions** of the stomach or intestine, including:

a-ulcer, e.g. of the abomasum or stomach , b-tumor, e.g. intestinal Adenocarcinoma

* + - 1. Indigestible **diet**, e.g. lactose intolerance in foals
			2. **Carbohydrate engorgement in cattle**
1. In some cases of **ileal** hypertrophy, ileitis, diverticulitis and adenomatosis
2. Terminal stages of congestive heart failure (**visceral edema**)
3. **Endotoxic** mastitis in cattle
4. Chronic and acute **undifferentiated** diarrhea in horses

11- **Vagus indigestion** in cows causes pasty feces but bulk is reduced.

**Malabsorption syndromes** :

monogastric farm animals failure to grow or maintain body weight but with normal appetite accompanied with diarrhea, due to villous atrophy, edema , necrosis, if ⇧eosinophils mean migrating strongyle larvae.

* (infectious agents (such as enterotoxigenic Escherichia coli) increase in the flow into the lumen decrease in outflow back into the systemic Circulation lead to distention intestine with fluid .infectious agents and enterotoxins in the lumen should be on evacuation so not on the use of anticholinergic drugs in this case)

**Constipation**

**Common causes of constipation or scant feces are:**

1. Chronic **dehydration**
2. Partial **obstruction** of large intestine
3. **Impaction** of the large intestine in the horse
4. **Deficient** dietary bulk, usually **fiber**
5. Diseases of the fore stomach and abomasum causing **failure of outflow**
6. Severe **debility**, as in old age
7. **Painful conditions of the anus**
8. Terminal stages of **pregnancy** in cows
9. Grass sickness in horses
10. Chronic **zinc poisoning** in cattle
11. Paralytic ileus

**Ileus (Adynamic and Dynamic ileus) :**

* paralytic ileus ( adynamic ileus )is a state of functional obstruction of the intestines or failure of peristalsis as a result of reflex inhibition.
* Dynamic or mechanical ileus is a state of physical obstruction.

**Common causes of Ileus :**

1- acute peritonitis

2-excessive handling of viscera during surgery

3-prolonged and severe distension of the intestines as in intestinal obstruction or enteritis.

4- acid-base imbalance dehydration, electrolyte imbalances such as hypocalcemia and hypokalemia.

5- toxemia causing dilatation with fluid and gas.

6- Infarction, thromboembolic colic due to verminous Infection

**Clinical findings :**

 Abdominal pain, dehydration,⇩ reduction in the amount of feces , Distension of the abdomen, fluid tinkling, fluid -splashing sounds, and pings on percussion of the abdomen.

**The treatment of ileus** depends on the original cause: surgically. Fluid therapy nasogastric tube, Nonsteroidal anti-inflammatory drugs (NSAlDs) are used to control abdominal pain. as Xylazine.

# D- Alimentary Tract Hemorrhage :

**The main causes are**:

1- Gastric or abomasal (rarely duodenal) **ulcers**

 2- Severe **hemorrhagic** enteritis

3- Structural **lesions** of the intestinal wall, e.g. adenomatosis, neoplasia

4- Infestation with blood-sucking **nematodes**, e.g. bunostomiasis

 5- Local vascular engorgement or obstruction as in intussusception and verminous thrombosis.

* Hemorrhage into the stomach results in the formation of acid hematin, which makes vomitus a dark brown color like coffee grounds, and feces have a black or very dark brown, tarry appearance (**melena**).
* If the blood originates in the small intestine, the feces may be brown-black.
* Bleeding in colon or cecum, the blood is unchanged and gives the feces an even red color.
* Hemorrhage into the lower colon and rectum may feces containing or consisting entirely of clots of whole blood.

# E-Abdominal Pain :

# In case stretching of the wall of the viscus, excessive peristalsis, edema and embolism of local blood supply, or in intestinal accidents

**Horses intestinal obstruction, gastric dilatation, enteritis, Thromboembolic colic ,impaction, ileal hypertrophy**

**Cattle: Intestinal obstruction. poisoning by kikuyu grass ,Traumatic reticuloperitonitis ,peritonitis ,Abomasal volvulus**

*The manifestations of abdominal pain vary with the species, include:*

 Clinically, abdominal pain can be detected by palpation.

***Horses:***

a)Acute pain: Pawing, flank-watching, rolling.

b) Subacute pain: Lesser degree of flank watching, often excessive pawing, lying down frequently without rolling, stretching out as if to urinate, males may extrude the penis, walking backwards, dog-sitting posture, lying on back, impulsive walking

c)peritoneal pain: Rigidity of the abdominal wall, pain on palpation.

***Cattle:***

a)Acute pain: ⇩Downward arching of back with treading of the hind feet, lying down . ***Calves*** will lie down and bellow with severe abdominal pain, as in abomasal torsion.

b)Subacute pain:c) including peritoneal pain: Back arched ⇧upwards, grunting on walking or lying down, grunting on deep palpation of the abdomen, immobility.

# Tenesmus, or persistent straining.

**F-Abdominal Distension :**

 accumulation gas, and engorgement on solid or liquid feeds with the alimentary tract. Due to occlusion by intestinal accident or pyloric or ileocecal valve obstruction.

1)Distension of the abdomen is a common manifestation of **disease of the alimentary tract**.

2) simple stomached animals **Intestinal tympany**, **Obstruction of the large intestine**.

3) **pregnancy**.

4) pneumoperitoneum, which usually follows **abdominal surgery.**

5) Retention of the meconium

**G - Shock And Dehydration** :

 **1)in distension** ( accumulation of saliva , gastric and intestinal secretions cause loss of fluid and electrolyte lead to fatal dehydration accompanied by acidosis due to large loss of acid from the stomach or alkalosis in the intestine )

 **2)lost** ( by vomiting, in diarrhea)

**Dehydration** and abnormalities of electrolyte concentration and acid-base balance.🡪🡪⇩ decreased circulating blood volume 🡪 Blood **pressure** ⇩⇩falls + **temperature** ⇩⇩falls below normal 🡪 ⇧⇧increase in **heart rate** 🡪**Shock** due to ⇩⇩depression of vasomotor, cardiovascular and respiratory functions . severe **metabolic acidosis** 🡪cardiac failure. Renal ischemia 🡪uremia.

* in horses fatally in 6-12 hours, cattle 3-4 days.