

UNIT-4 (ARTHROPODS OF VETERINARY IMPORTANCE)

Topics: *Ixodes*, *Hyalomma*, *Rhipicephalus (Boophilus)*, *Haemaphysalis*, *Dermacentor* and *Amblyomma*

HARD TICKS

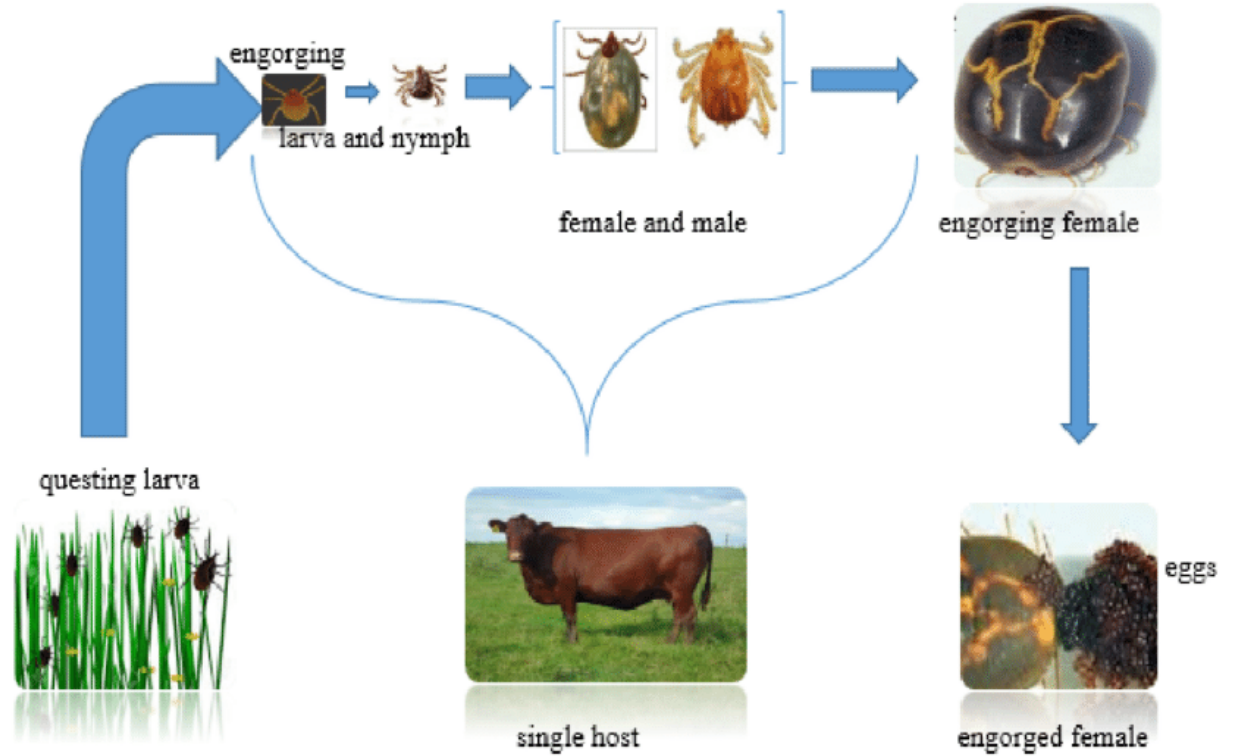
Family: Ixodidae

Chitinous plates are present on the body of hard ticks, on dorsal surface, there is a chitinous plate called Scutum. In male, entire dorsal surface is covered by scutum. In female, larval and nymphal stages show scutum which covers very small portion of dorsal surface just behind gnathosoma. Females are 2 to 3 times bigger than males because females are voracious blood suckers. On ventral surface (side) in male ticks certain chitinous plates are present called as ventral plates. These ventral plates are absent in female. On anterior end, mouth parts are located on chitinous plate called as "Basis capitulum". Proboscis consist of two pedipalps, two chelicerae and a hypostome so ticks are attached to body of host as mouth parts are inserted to skin have firm grip. In some species of ticks, the posterior margin had series of notches and these are referred as festoons. Eyes are present, in some species they are located at the level of 2nd coxae. In hard ticks, spiracles are present posteriolateral to 4th coxae and depending upon shape of spiracles, different species and also males and females can be identified. In addition to these, in some species, colored enamel like areas are present, such ticks are called as "Ornate ticks" e.g. *Amblyomma*, *Dermacentor* while others are inornate ticks.

Life cycle of hard ticks: Female ticks after engorgement drop down from body of host. In cracks and crevices they lay eggs. The period between dropping of female ticks from body of host till deposition of eggs is known as "Preoviposition period", which is greatly influenced by

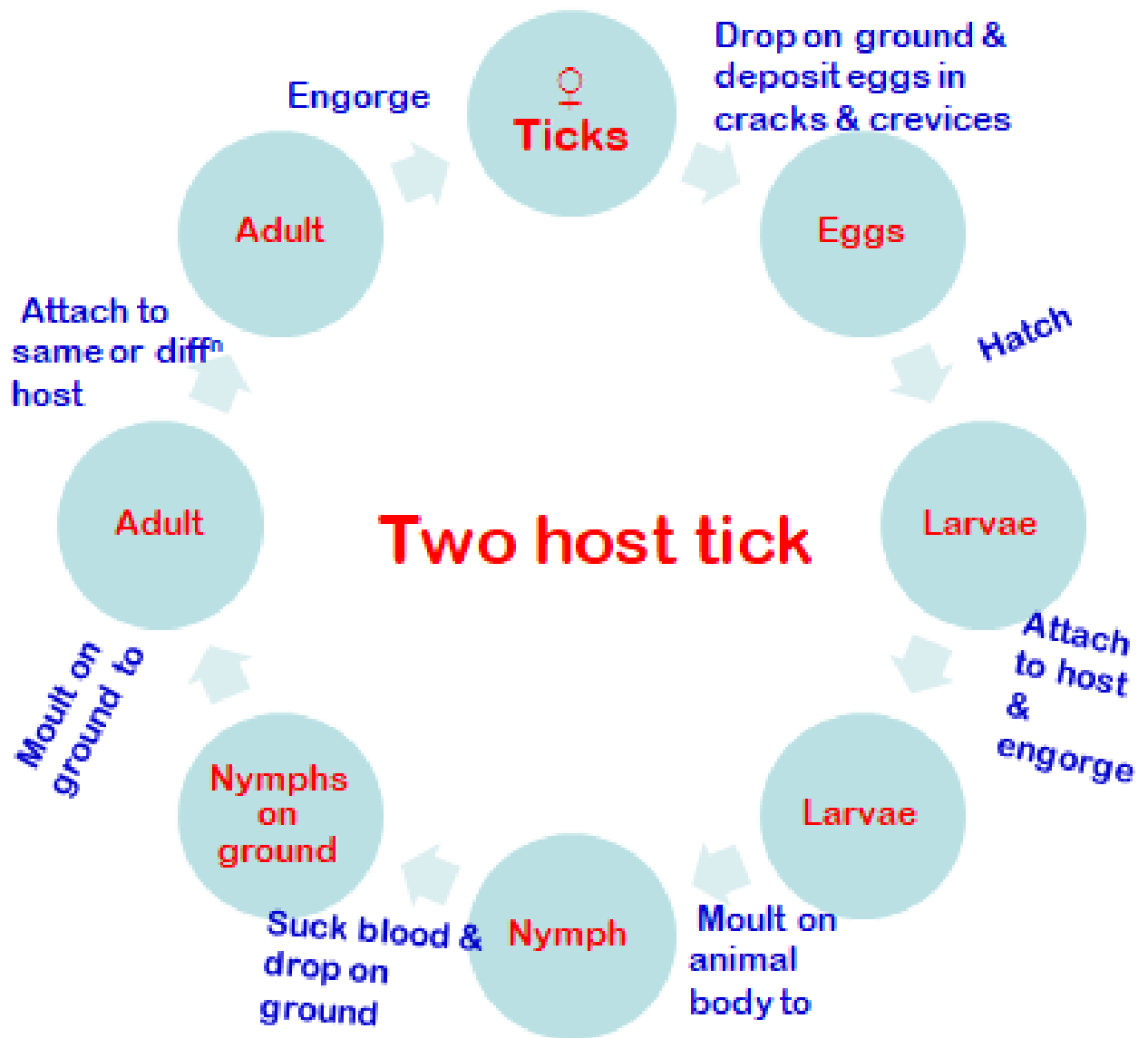
temperature and relative humidity. The egg laying is a continuous process which is extended over a period of few days and this period is known as “Oviposition period” and all the eggs are laid during these period. One female lays around 4,000 to 18,000 eggs during her life span. These eggs are spherical and yellowish brown in colour and laid in masses. Eggs are cemented to each other by sticky substance. Then eggs hatch and larvae comes out. The larva has three pairs of legs and on dorsal side short scutum is present. Larvae climb on grass blades, plant and remain at tip of grass blades and while animal is passing, they attach themselves to body of host. The larval stages which are present at tip of grass blades, are also referred as “**Seed Ticks**”. Larval stages feed upon host blood and moult to nymphal stages. There is only one nymphal stage in life cycle of hard ticks. The nymphal stages suck blood and moult to adult stages. Then the copulation occur and subsequently adult stages start sucking blood and engorged females drop from body of host and lay eggs in cracks and crevices where as male remain on body of host for one month. Female ticks die immediately after deposition of eggs. All stages are parasitic. Depending upon location of moults and number of times host is required for completion of life cycle, ticks can be divided into three groups.

1. One Host Tick:



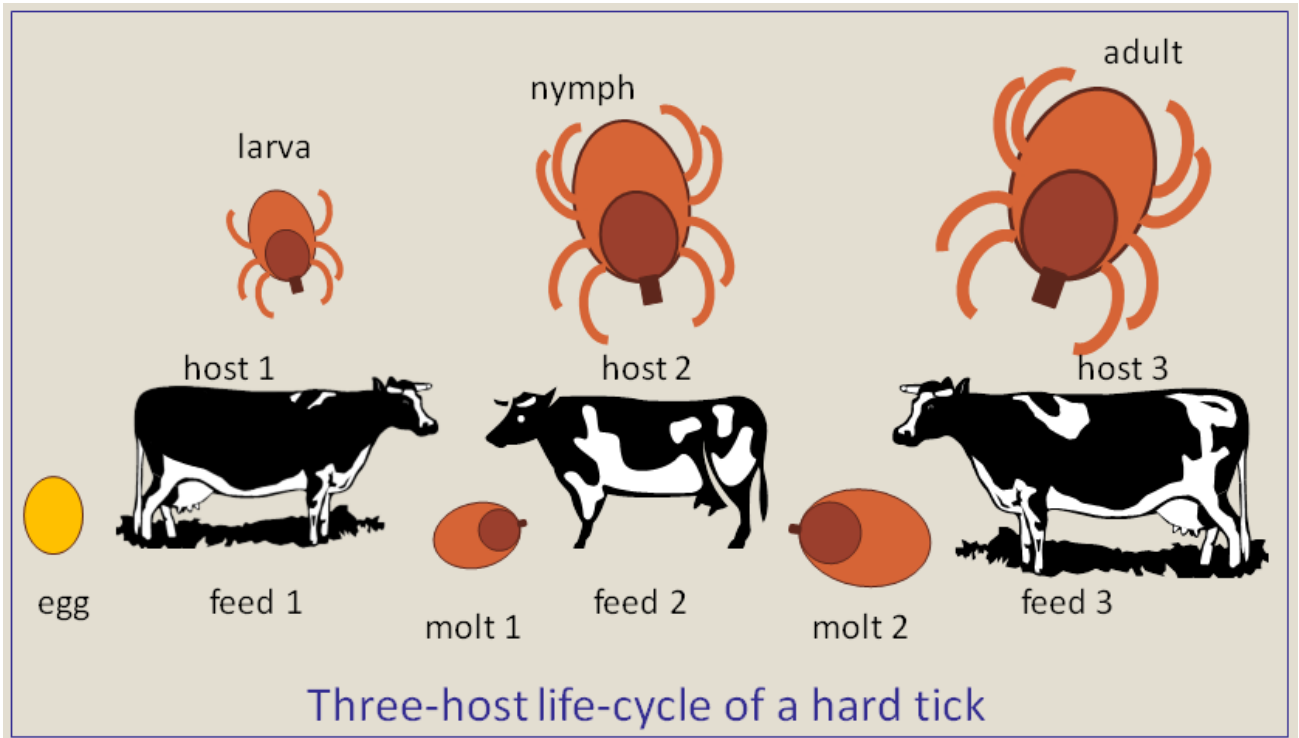
In this case, both the moults occur on the body host and since host is required only once for completion of life cycle, tick is known as one host tick.e.g. *Boophilus microplus*.

2. Two Host Tick:



In this case, either same or different host is required twice, and 1st moult occurs on the body of host whereas 2nd moult occurs on the ground, hence it is called as two host tick. *e.g.* *Rhipicephalus evertsi*, *Rhipicephalus bursa*.

3. Three Host tick:



In this case, both the moults occur on the ground, host is required for three times for the completion of life cycle, therefore ticks are known as “Three Host Ticks.” *e.g. Haemaphysalis, Hyalomma, Amblyomma* and *Ixodes*.

Genus – *Ixodes*

Characters-Palpi long, anal groove surrounds the anus anteriorly, inornate, eyes and festoons absent, ventral surface of male armed with pregenital, median, anal, epimeral and adanal shields. Stigmatic plates oval in male and circular in female.

Ixodes ricinus

Also called castor bean tick or sheep tick, three host tick

The tarsi taper away to their ends and are not humped. The postero- internal angle of coxa –I bears a spine which is long enough to overlap coxa –II.

Life cycle:

Pre-oviposition period-	7-22 days
Oviposition period	- about 30 days
Eggs hatch	- 2-36 weeks
Larvae engorge	- 2-6 days
Larvae moult	- 4-51 weeks
Nymphs engorge	- 3-7 days
Nymphs moult	- 8-28 weeks
Females engorge	- 5-14 weeks
Unfed larvae survive	- 13-19 months
Unfed nymph survive	- 24 months
Unfed adults survive	- 21-27 months

Significance- It is responsible for transmission of *Babesia divergens*, *Babesia bovis*, *Anaplasma marginale*, virus of louping ill and *Coxiella burnetti*.

Ixodes holocyclus – paralysis tick of Australia

Ixodes scapularis- shoulder tick or black legged tick.

Genus – *Boophilus*

Anal groove absent in female, faint in male and surrounding the anus posteriorly. Inornate, eyes present, festoons absent, palps and hypostome short, palps with prominent transverse ridges, cox-I bifid, spiracles circular or oval. Males are provided with adanal or accessory shields and a caudal process, fourth pair of legs are ordinary in size.

Boophilus microplus-

One host tick, also called tropical cattle tick

Life cycle:

Female lays	-	4400 eggs
Pre-oviposition period-		2-39 days
Oviposition period	-	4-44 days
Eggs hatch	-	14-146 days
Parasitic period on host-		17-52 days
Unfed larvae survive	-	upto 20 weeks

Significance: It is responsible for transmission of *Babesia bigemina*, *Anaplasma marginale* and *Coxiella burnetti*.

Boophilus annulatus- one host tick also called north American tick transmits *Babesia bigemina* in America

Boophilus decoloratus- one host tick also called blue tick

Genus – Hyalomma

Inornate, sometimes ornate, eyes present, festoons present or absent, hypostomes and palps long, male with a pair of adanal shields and sometimes accessory adanal shields, spiracles comma shaped in males and triangular in female

Usually two host tick, though three hosts may be used by some species.

Important species – *Hyalomma anatolicum anatolicum*, *Hyalomma marginatum*, *H. dromedarii*

Life cycle data-

Pre-oviposition period-	4-12 days
Oviposition period -	37-59 days
Eggs hatch-	34-66 days
Larvae engorge-	5-7 days
Larvae moult-	2-15 days
Nymphs engorge-	7-10 days
Nymphsmoult-	14-95 days
Larvae and nymph on host-	13-45 days
Females engorge	5-6 days
Unfed larvae survive-	12 months
Unfed nymph survive-	3 months
Unfed adults survive-	14 months

Significance:

Ittransmits *Theileria annulata*, *Theileria parva*, *Theileria dispar*, *Babesia caballi*, *Babesia equi*, *Coxiella burnetti*

Genus- *Rhipicephalus*

Usually inornate, eyes and festoons present, hypostomes and palpi short, basis capituli hexagonal dorsally, coxae-I with two strong spurs, males with adanal shields and usually also accessory adanal shields, frequently with a caudal prolongations when engorged, spiracles are comma shaped, short in female and long in male.

Rhipicephalus appendiculatus-

Brown ear tick, three host tick

It transmits *Theileria parva*, *Theileria mutans*, *Hepatozoon canis*, viruses of Nairobi sheep disease, louping disease. In heavy infection, tick toxicosis may occur.

Rhipicephalus sanguineus:

Brown dog tick, three host tick

Life cycle:

Female lays-	4000eggs approx.
Eggs hatch-	17-30 days or longer
Larvae engorge-	2-4days
Larvae moult-	5-23 days
Nymphs engorge-	4-9 days days
Nymphsmoult-	11-73 days
Females engorge	6-21 days
Unfed larvae survive-	upto 8 and 1/2 months
Unfed nymph survive-	upto 6 months
Unfed adults survive-	upto 19 months

Significance:

It transmits *Babesia canis*, *Babesia caballi*, *Babesia equi*, *Anaplasma marginale*, *Coxiella burnetti*, *Pasturella tularensis*, *Hepatozoon canis*.

Rhipicephalus evertsi:

Red legged tick, two host tick

It transmits *Theileria parva*, *Babesia bigemina*, *Theileria mutans*, *Borrelia theileri*, *Babesia equi*

Rhipicephalus bursa: Two host tick

It transmits *Babesia ovis*, *B. equi*, *B. caballi*, *B. berbra*, *Theileria ovis* , *Anaplasma marginale*, *Coxiella burnetti*, virus of nariobi sheep disease.

Genus: *Haemaphysalis*

Ticks are inornate, eyes are absent, festoons present, palps usually short and conical, the second articles having conspicuous lateral projections. The trochanter of the first pair of legs bears a dorsal process. Spiracles are ovoid or comma shaped in females and ovoid in males. Ventral surface of male is without plates. Species usually of small size

Haemaphysalis leachi leachi

The yellow dog tick, three host tick

Life cycle:

Female lays-	5000 eggs approx.
Pre-oviposition period-	3-7 days
Eggs hatch-	26-37 days or longer
Larvae engorge-	2-7 days
Larvae moult-	about 30 days
Nymphs engorge-	2-7 days
Nymphs moult-	10-16 days
Females engorge	8-16 days
Unfed larvae survive-	6 months or longer
Unfed nymph survive-	2 months or longer
Unfed adults survive-	7 months or longer

It transmits the *Babesia canis*.

Genus - *Dermacentor*

Usually ornate, eyes and festoons are present, Hypostomes and palps short, coxa-I bifid and coxa IV of male much larger than coxae I to III. No plates on ventral surface of male.

Dermacentor reticulatus: Three host tick

It transmits *Babesia caballi*, *B. equi* and *B. canis*.

Dermacentor andersoni:

Three host tick, transmits rocky mountain spotted fever, tularemia (*Pasteurella tularensis*) to man, equine encephalomyelitis, *Anaplasma marginale*, *Babesia canis*, *Coxiella burnetti*, *Leptospira pomona*. It also causes tick paralysis in man and animals.

Dermacentor variabilis- American dog tick, three host tick

Dermacentor nitens- tropical host tick, one host tick

It transmits equine piroplasmiasis.

Genus: *Amblyomma*

Usually ornate, eyes and festoons present, hypostomes and palps long, males without ventral plates, but small chitinous plates may be present close to the festoons. The species are usually large and broad.

Amblyomma hebraeum:

Also called bont tick, three host tick

Life cycle:

Female lays- 20000 eggs

Pre-oviposition period- 6-26 days

Eggs hatch- 4-13 weeks

Larvae engorge-	4-7 days
Larvae moult-	25-66 days
Nymphs engorge-	4-20 days
Nymphs moult-	21 days to 3 months
Females engorge	10-20 days
Unfed larvae survive-	7months
Unfed nymph survive-	6 months
Unfed adults survive-	7 – 20 months

It transmits *Rickettsia ruminantium*, the cause of heart water disease in cattle and sheep.

Amblyomma variegatum- also called variegated tick or tropical bont tick, three host tick.

It transmits heart water disease in cattle and sheep, Nairobi sheep disease and *Coxiella burnetti*.

Amblyomma americanum- also called lone star tick.

Habits of hard ticks:

1. Each species has got its own requirement regarding temperature and relative humidity.
2. Ticks are not rigidly host specific.
3. They suck blood (All stages suck blood) and they suck blood only once in each stage.