Field guide for transabdominal pregnancy diagnosis in sheep and goats

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Field guide for transabdominal pregnancy diagnosis in sheep and goats

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Introduction

Meat and milk depend on reproduction

We always need to increase reproductive efficiency using “Clean, Green and Non-invasive” practices. Ultrasound-based technologies fall under the last category.

Early determination of pregnancy status

important management practice towards higher reproductive efficiency.

Transabdominal ultrasound

efficient approach for monitoring pregnancy and fetal growth in small ruminants.

The main criteria for **positive diagnosis of pregnancy in sheep** are the visualization of anechoic cross sections of the uterine lumen (embryonic vesicle), embryo fetus or placentomes in the amniotic fluid.

In this image, the fetus appears as an echogenic structure inside a non-echogenic structure.

Objective

Early identification of open (non-pregnant) females provides a better evaluation of:

1. Flock fertility as related to management practices
2. Efficacy of artificial insemination or synchronization protocols
3. Possible underlying infectious/non-infectious diseases.

Knowing the pregnancy status of an animal is invaluable in making management decisions regarding nutrition and herd health, such as:

1. Adjusting nutrition to provide for fetal demands
2. Administration of vaccines to prevent abortion and ensure passive transfer of immunity.

Field practicality

Transabdominal ultrasound diagnosis in sheep ranges from 25 to 110 days of gestation. The optimum time for detecting pregnancy is from 45 to 90 days of gestation.

Early pregnancy diagnosis can improve reproductive performance by decreasing the interval between successive parturitions and coupling a non-pregnancy diagnosis with an appropriate strategy to rapidly rebreed the animal (nutritional boost, hormone therapy...).

Determination of fetal number would allow producers to separate animals carrying singles, twins or triplets for differential nutritional management.

Estimation of foetal age, monitoring of foetal growth across time and diagnosis of pregnancy disorders can be performed and are key information to prepare for the lambing environment.

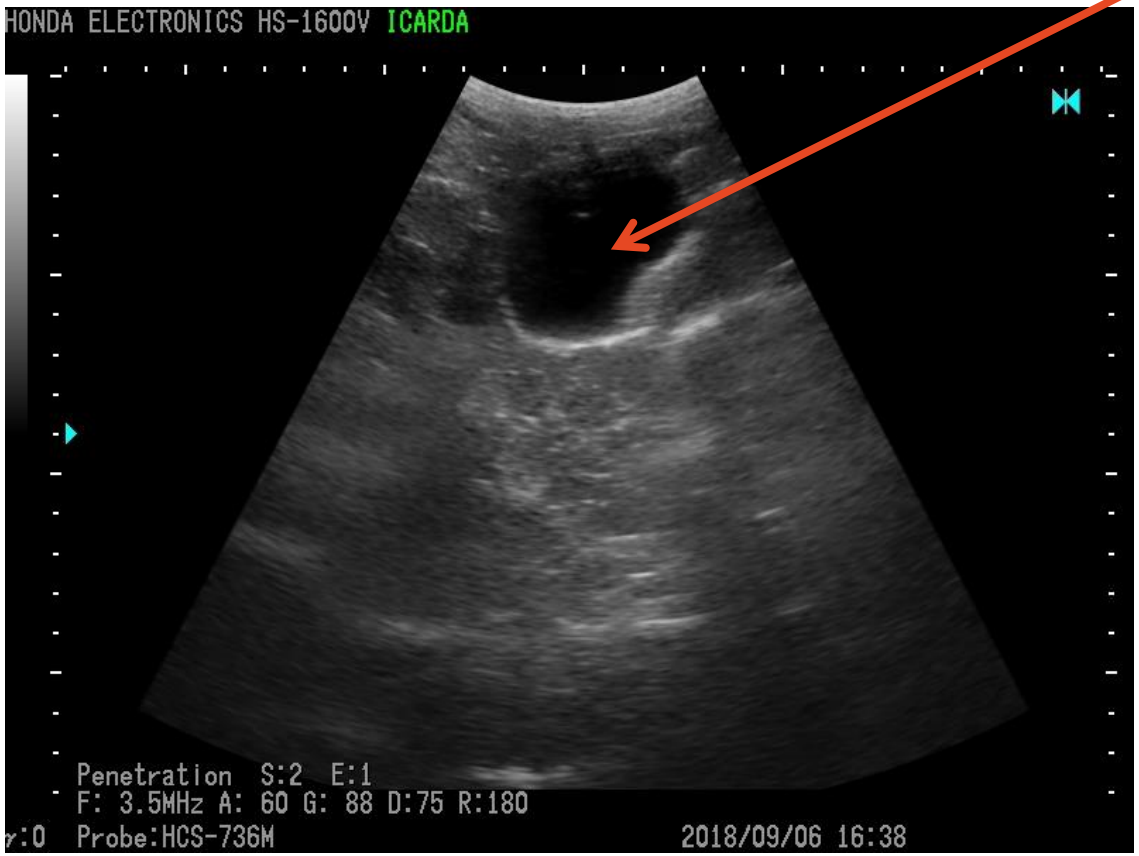
Device set-up and scanning area

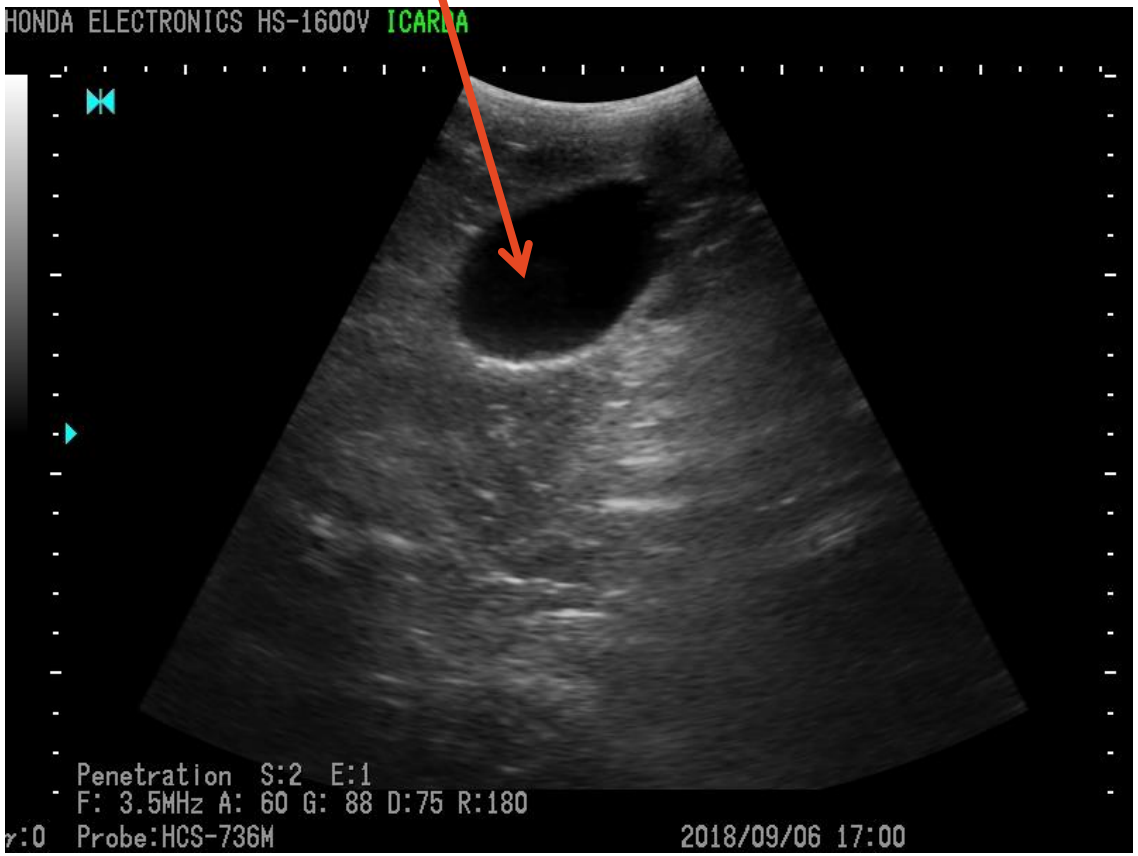
1. **Ultrasound scanner equipment** with a 3.5-5 MHz probe is used for abdominal diagnosing pregnancy
2. **Food and water are withheld** overnight for 12 hours before scanning.
3. The animal is **lightly restrained** by one person against railing in standing position.

4. Scanning is performed in the **fleece–less inguinal region** of the animal.
5. An **ultrasound coupling gel** is applied each time to the probe to develop good contact and to remove air between probe and animal skin.

Non pregnant sheep

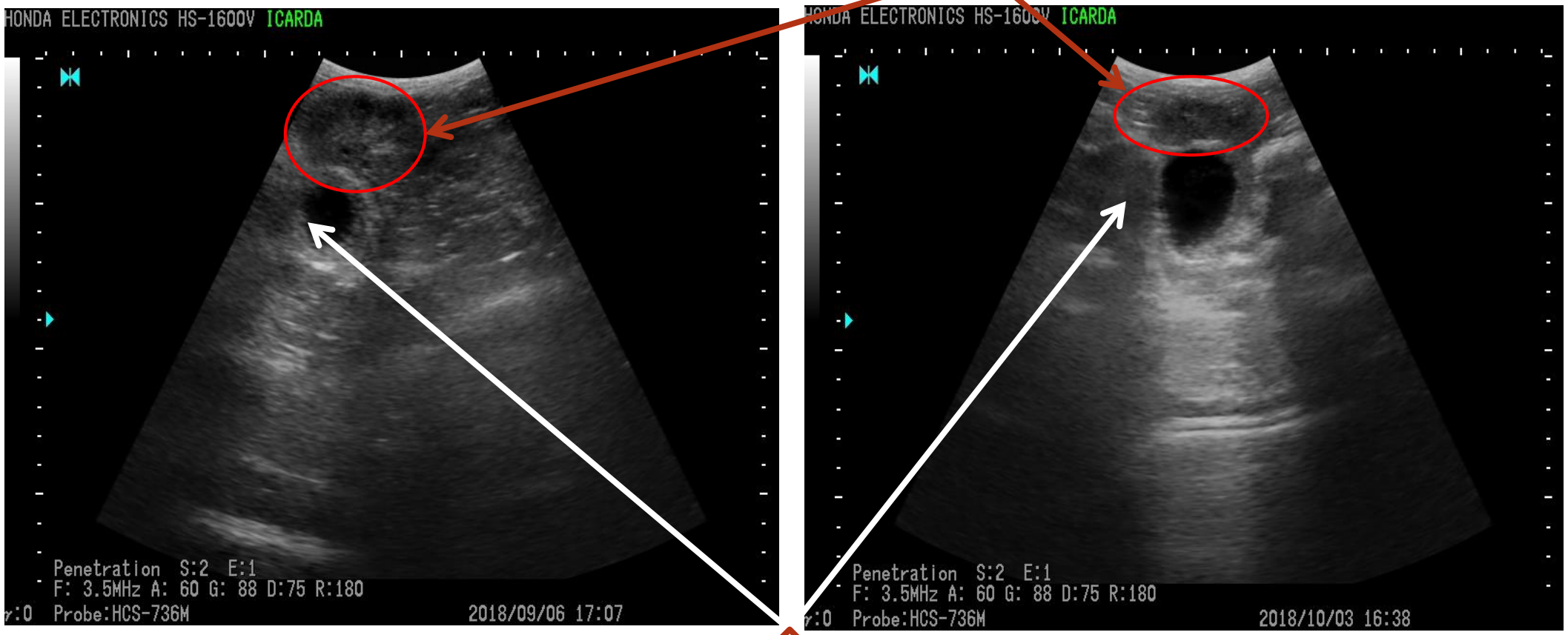
Filled urinary bladder





Non pregnant sheep

uterus



The non-pregnant uterus lies just cranial to the non-echogenic, fluid-filled bladder.

Embryonic period

Genesis of the main organ systems
0 – 40 days of gestation

#25 days

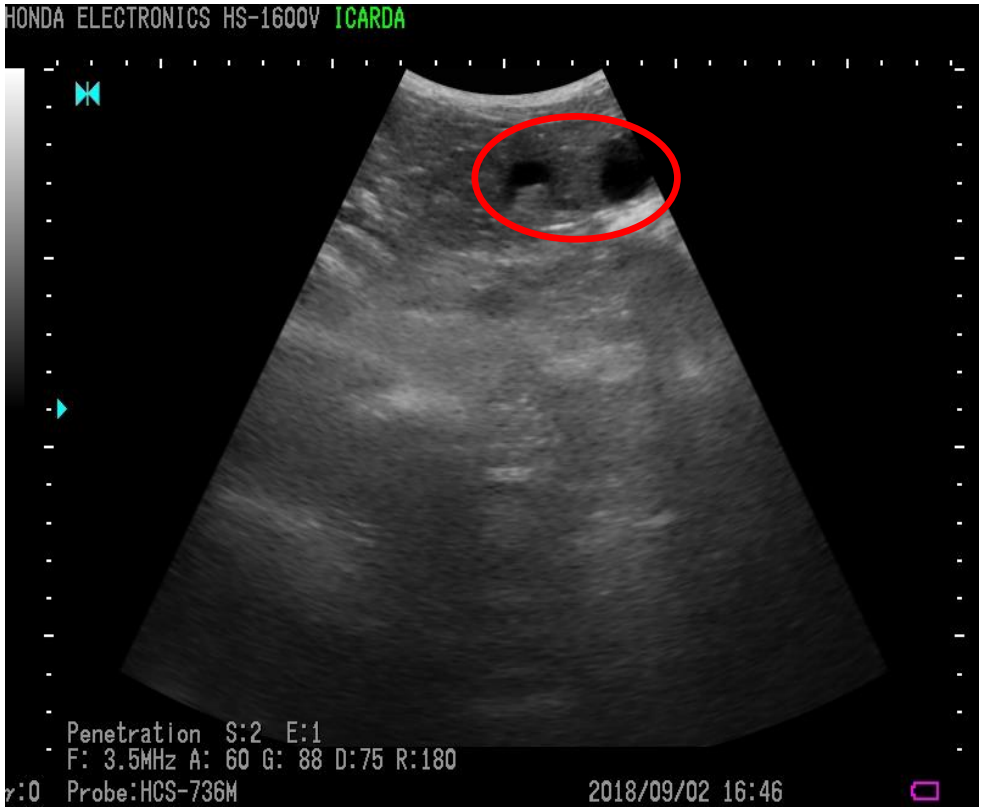
Main structures

Gestational sac

#25 days

- The **amnion** can be first imaged at day 25 of gestation
- Enlarged **uterus**
- Centrally located **embryo**
- **Multiple fetuses** are difficult to positively identify

#25 days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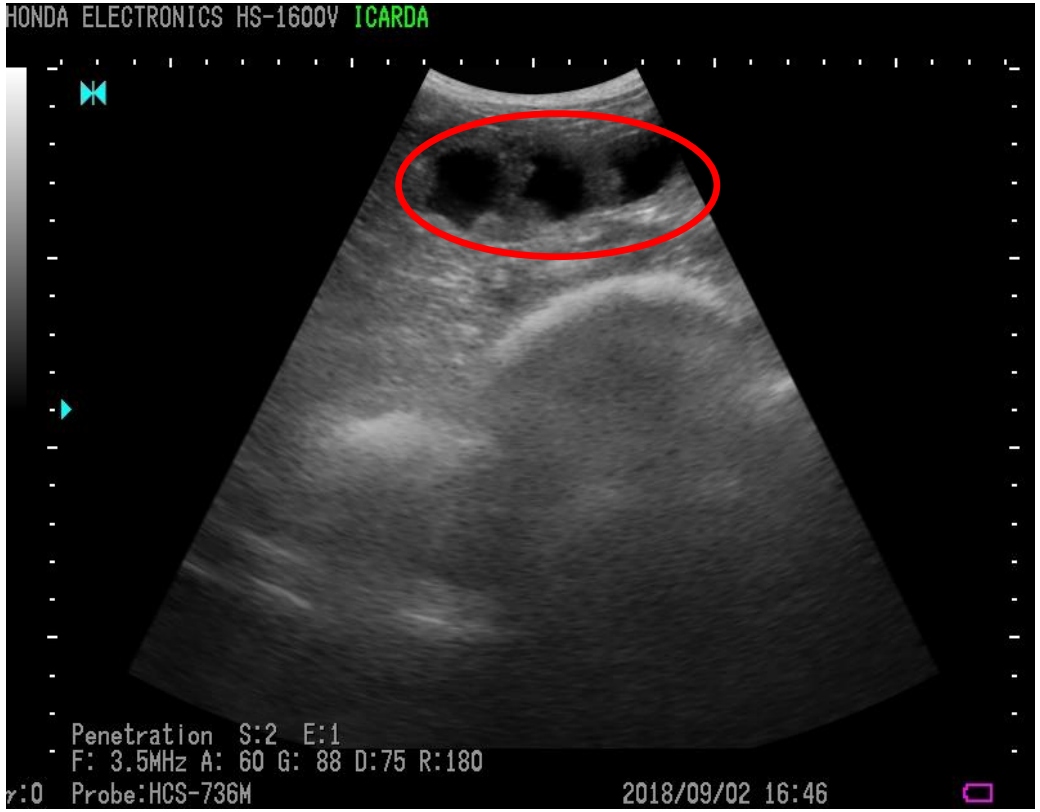
2018/09/02 16:46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Penetration S:2 E:1
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γ:0 Probe:HCS-736M
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30-35 days

Main structures

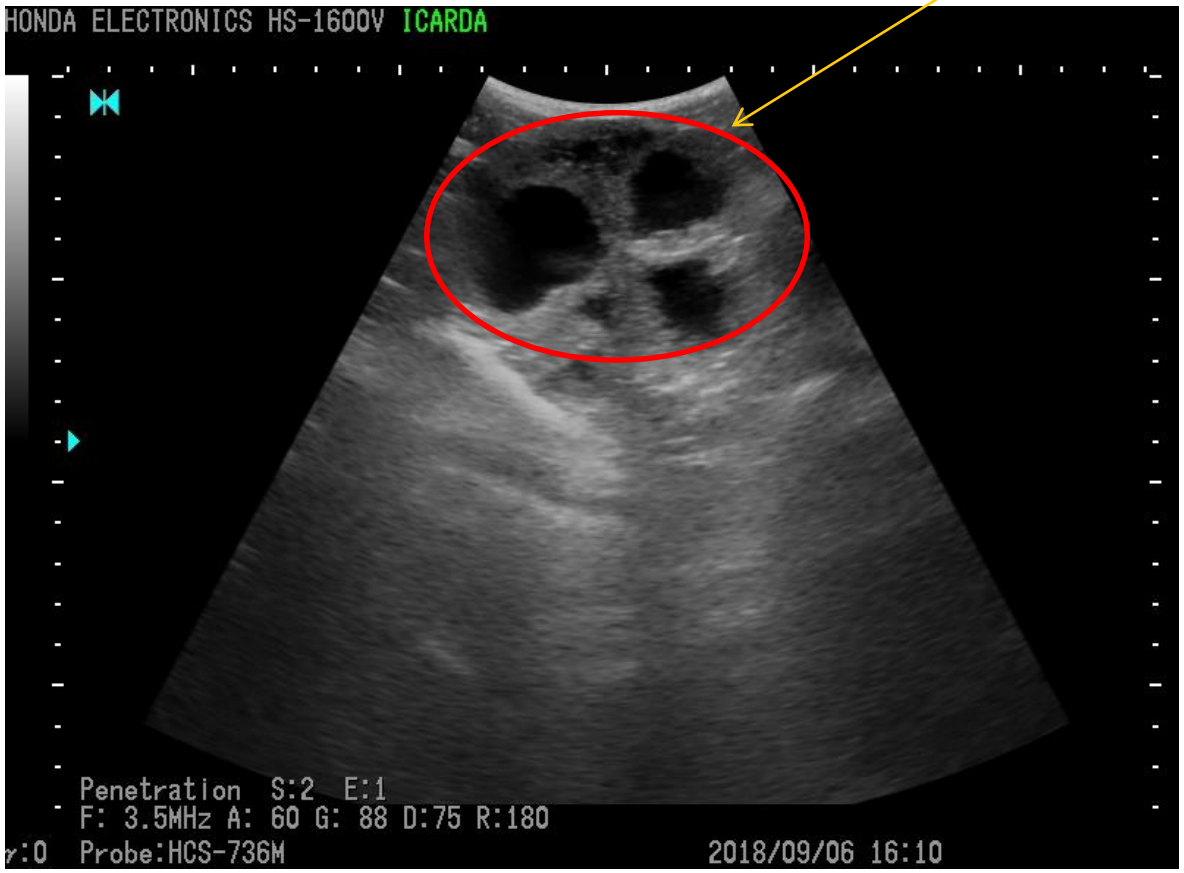
- Embryonic vesicles

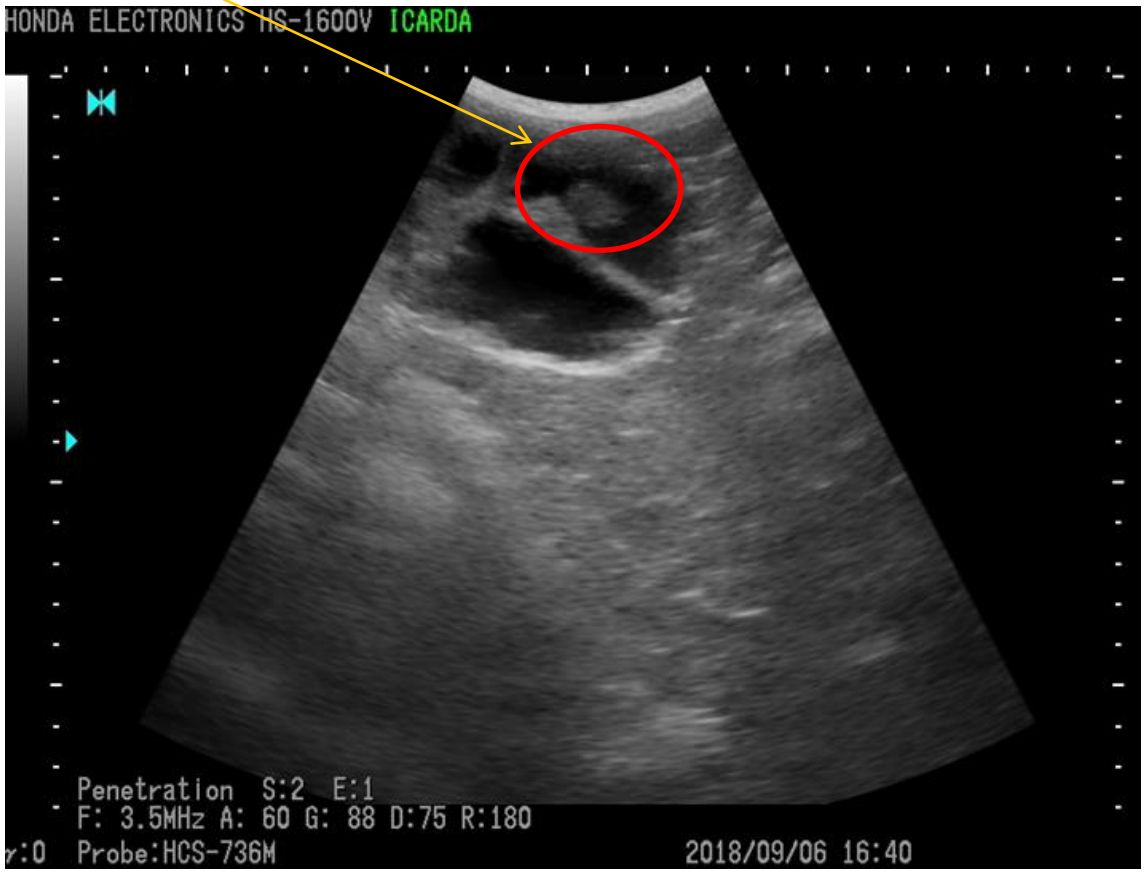
Complementary structures

- Embryo with no differentiated structures.
- Number of embryos.
- Heart beat (no freeze mode)

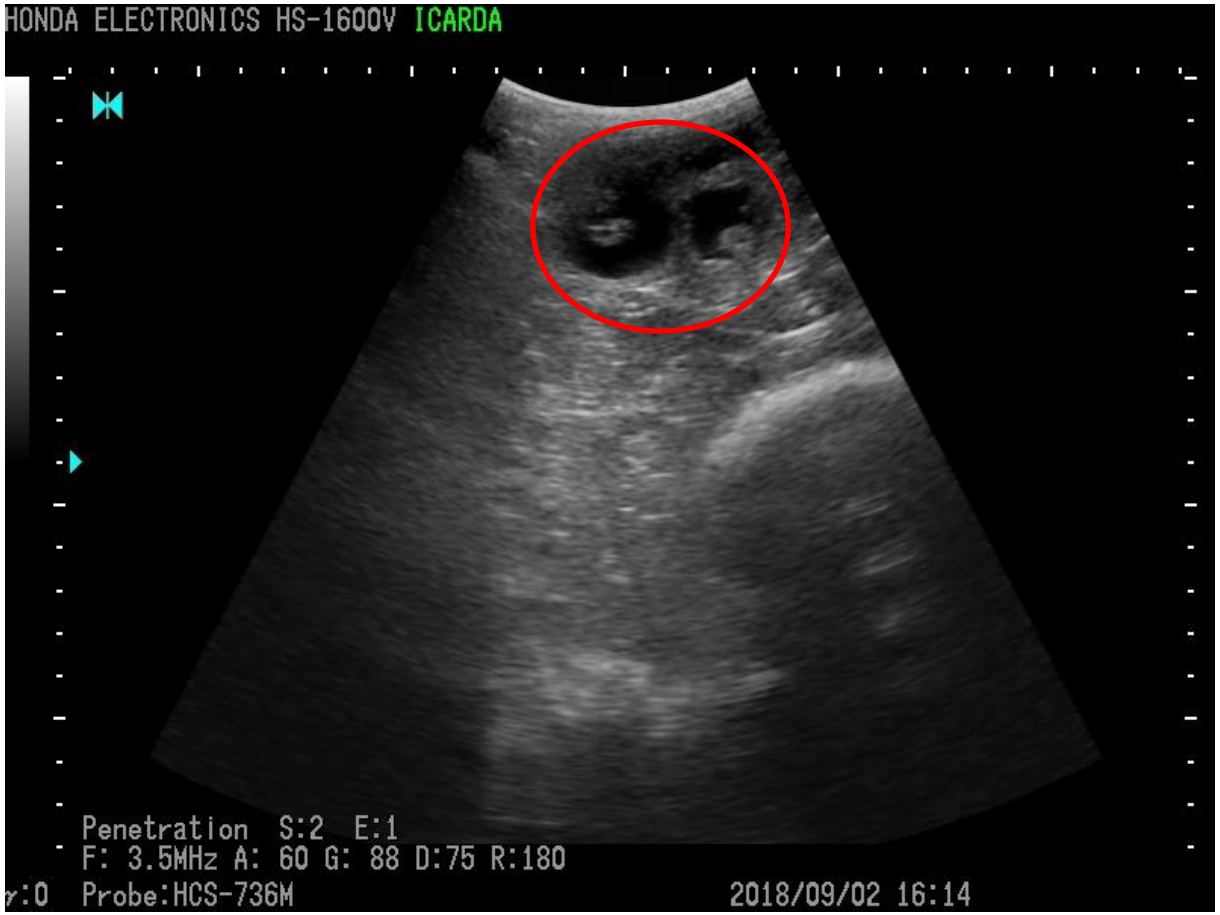
30-35 days

Embryonic vesicles





30-35 days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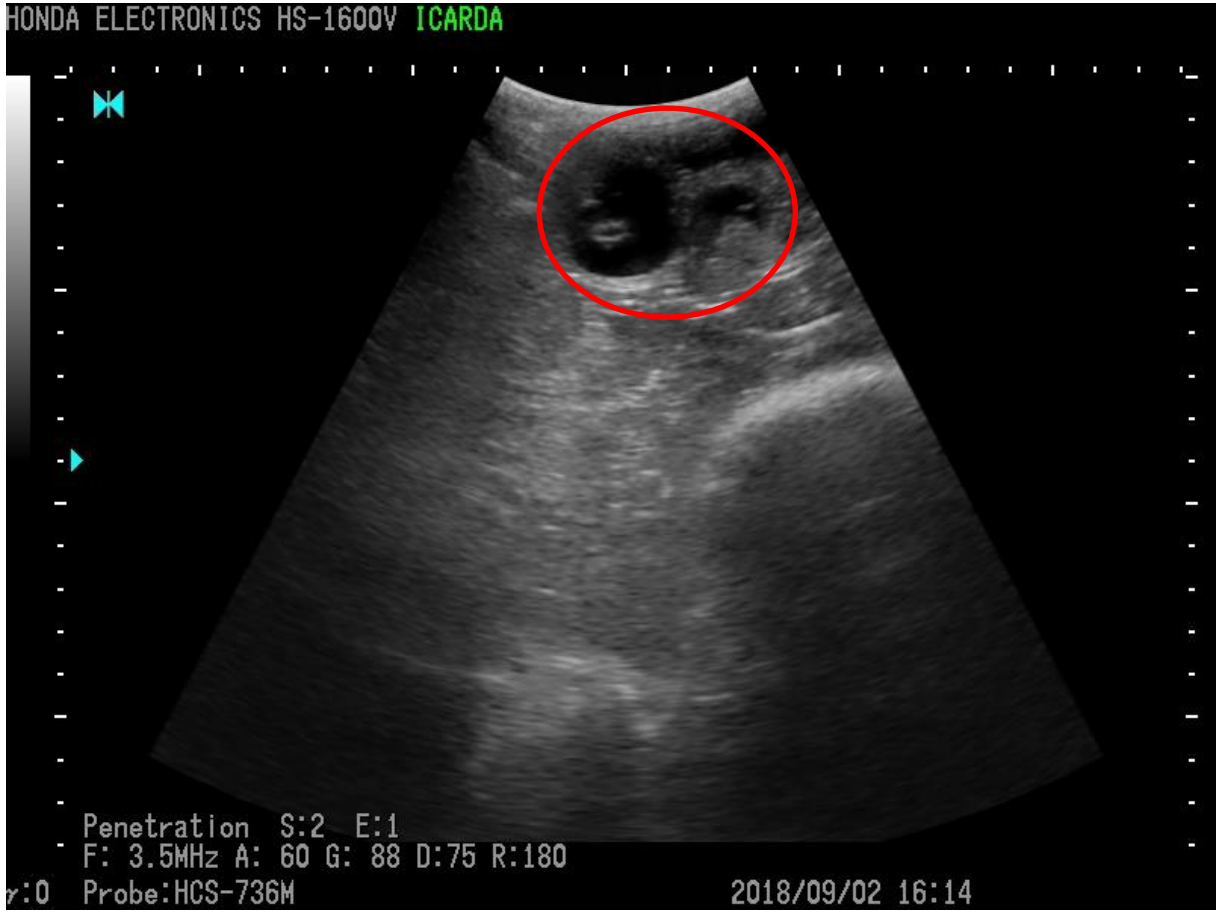
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Penetration S:2 E:1
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γ:0 Probe:HCS-736M
2018/09/02 16:14

Fetal period

Growth, Development and Differentiation
45 – 150 days of gestation

40-45 days

Main structures

- Placentomes in 80 % of cases

Complementary structures

- Differentiation; head-trunk, heart beat
- Number of fetus determination is optimal

40-45 days


HONDA ELECTRONICS HS-1600V ICARDA
Penetration S:2 E:1
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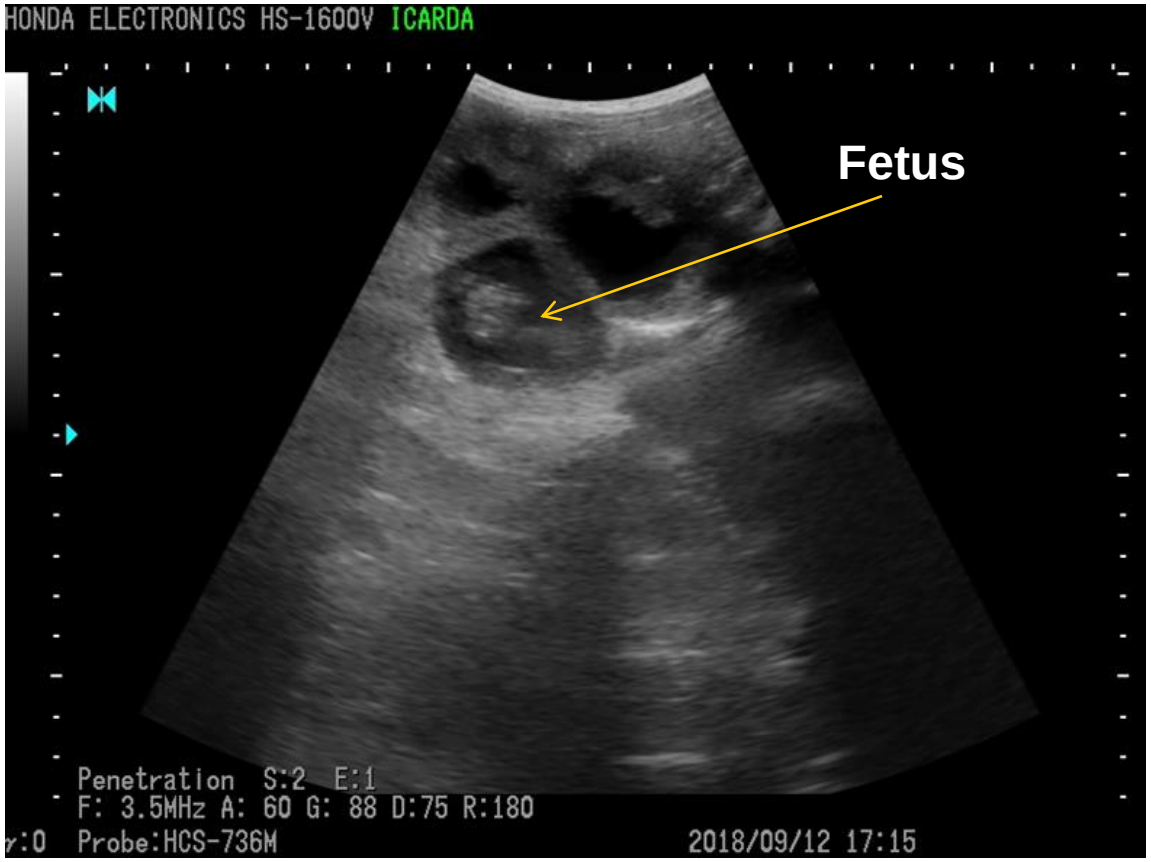
40-45 days


HONDA ELECTRONICS HS-1600V ICARDA
Fetus
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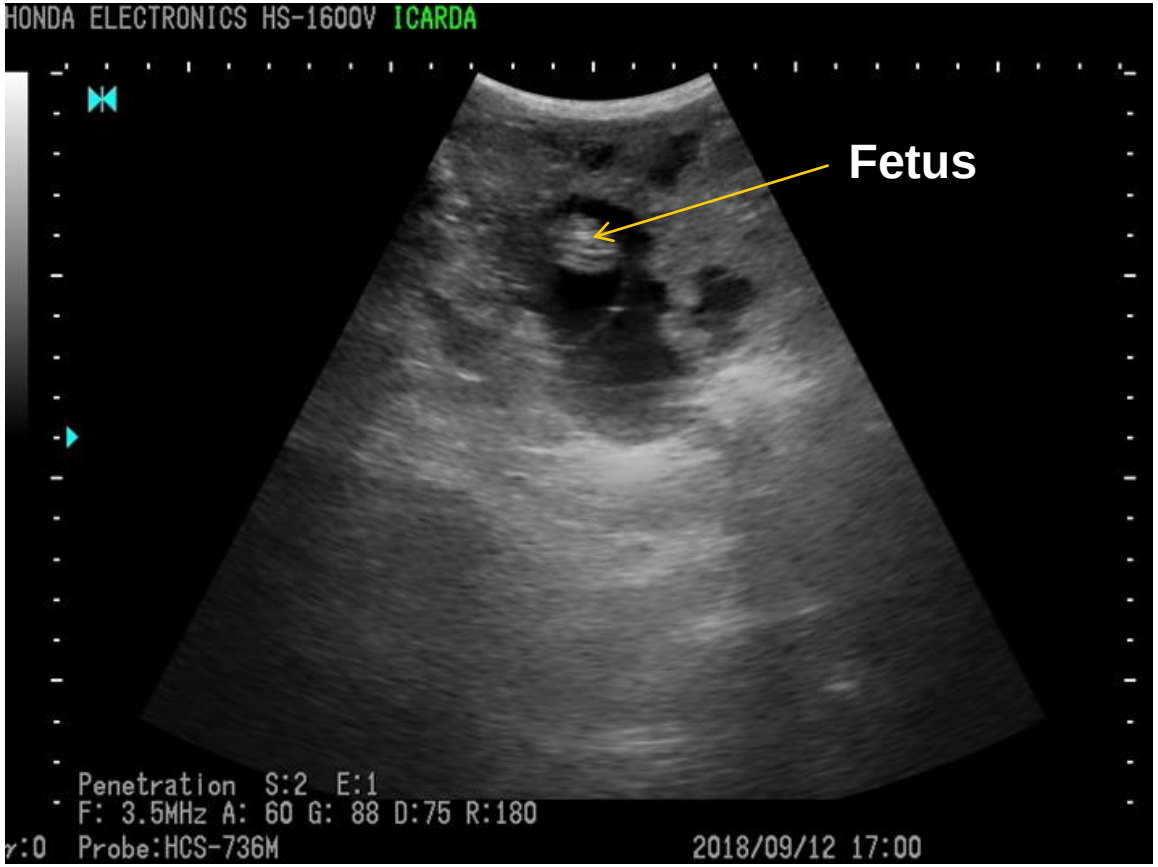
HONDA ELECTRONICS HS-1600V ICARDA
Fetus
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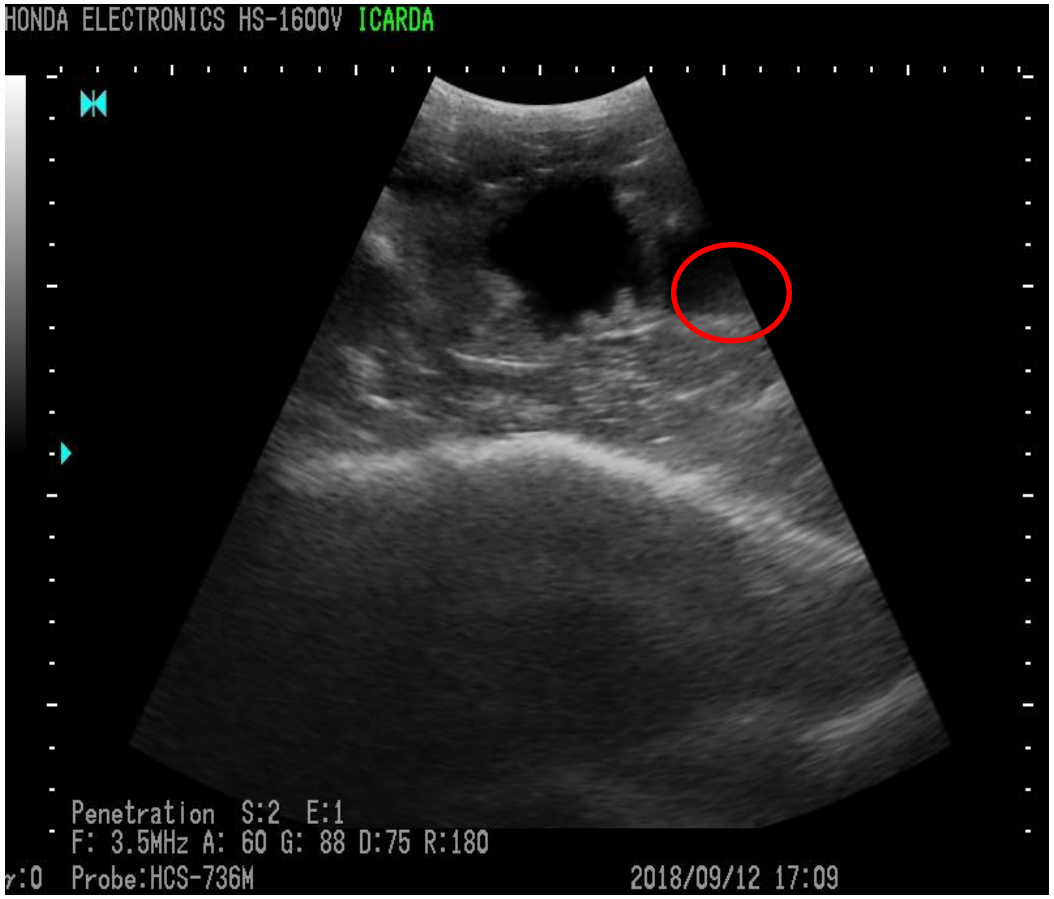
40-45 days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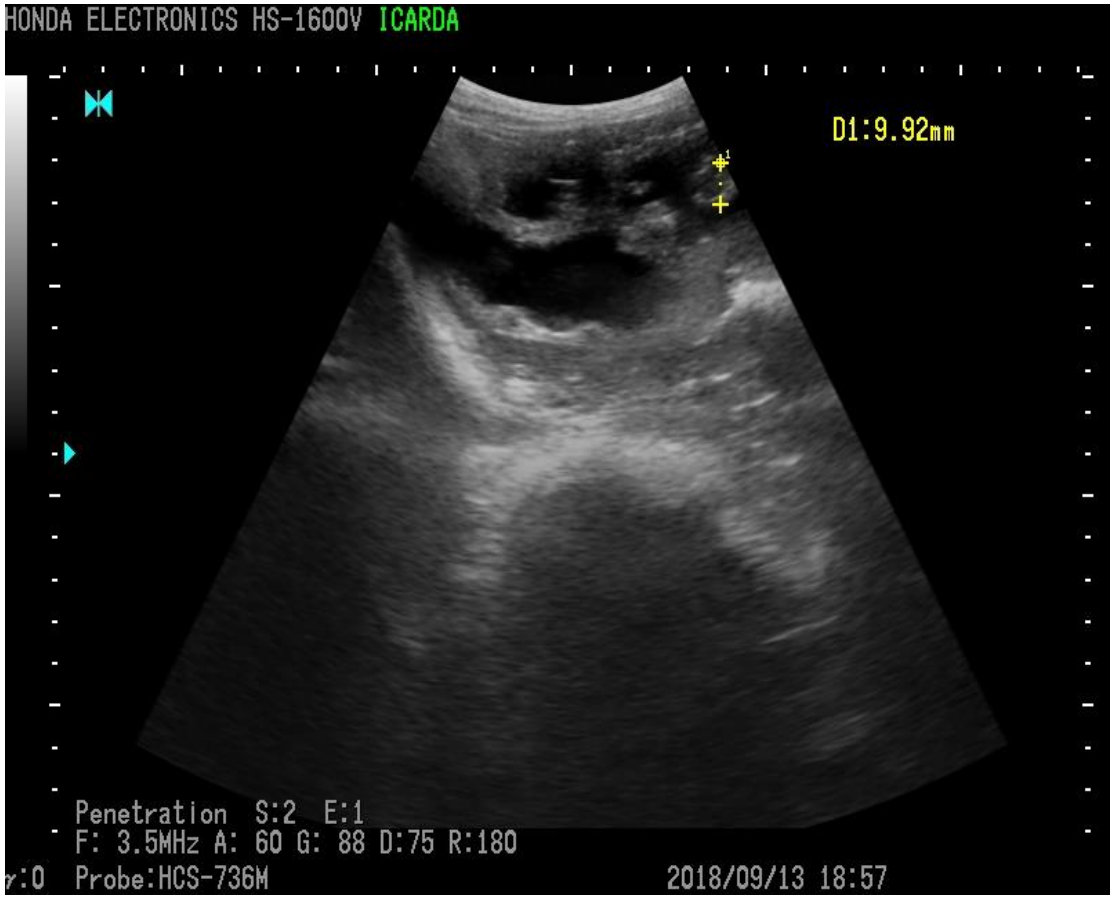
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D1:9.92mm
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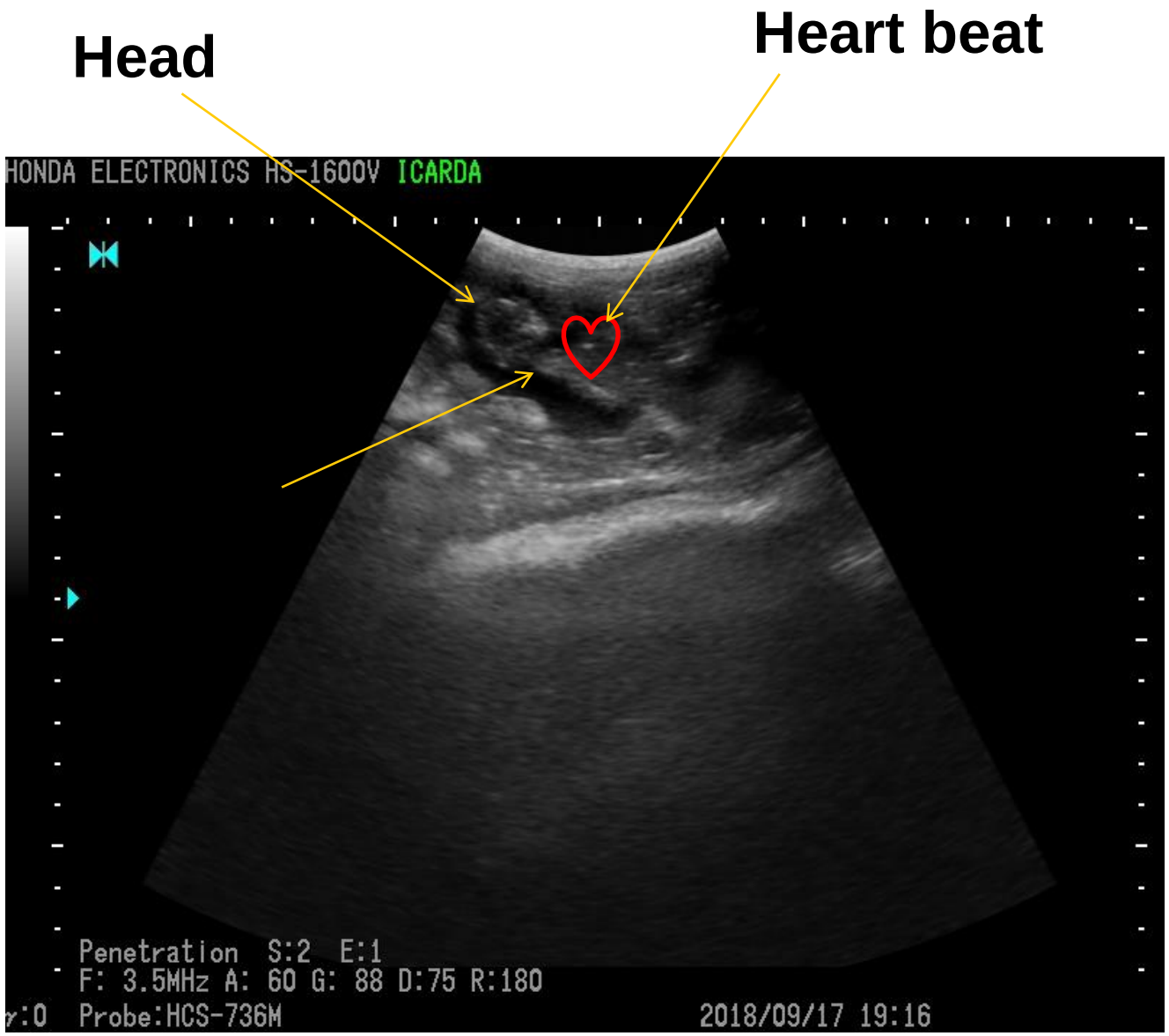
40-45 days


Head
Heart beat
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Penetration S:2 E:1
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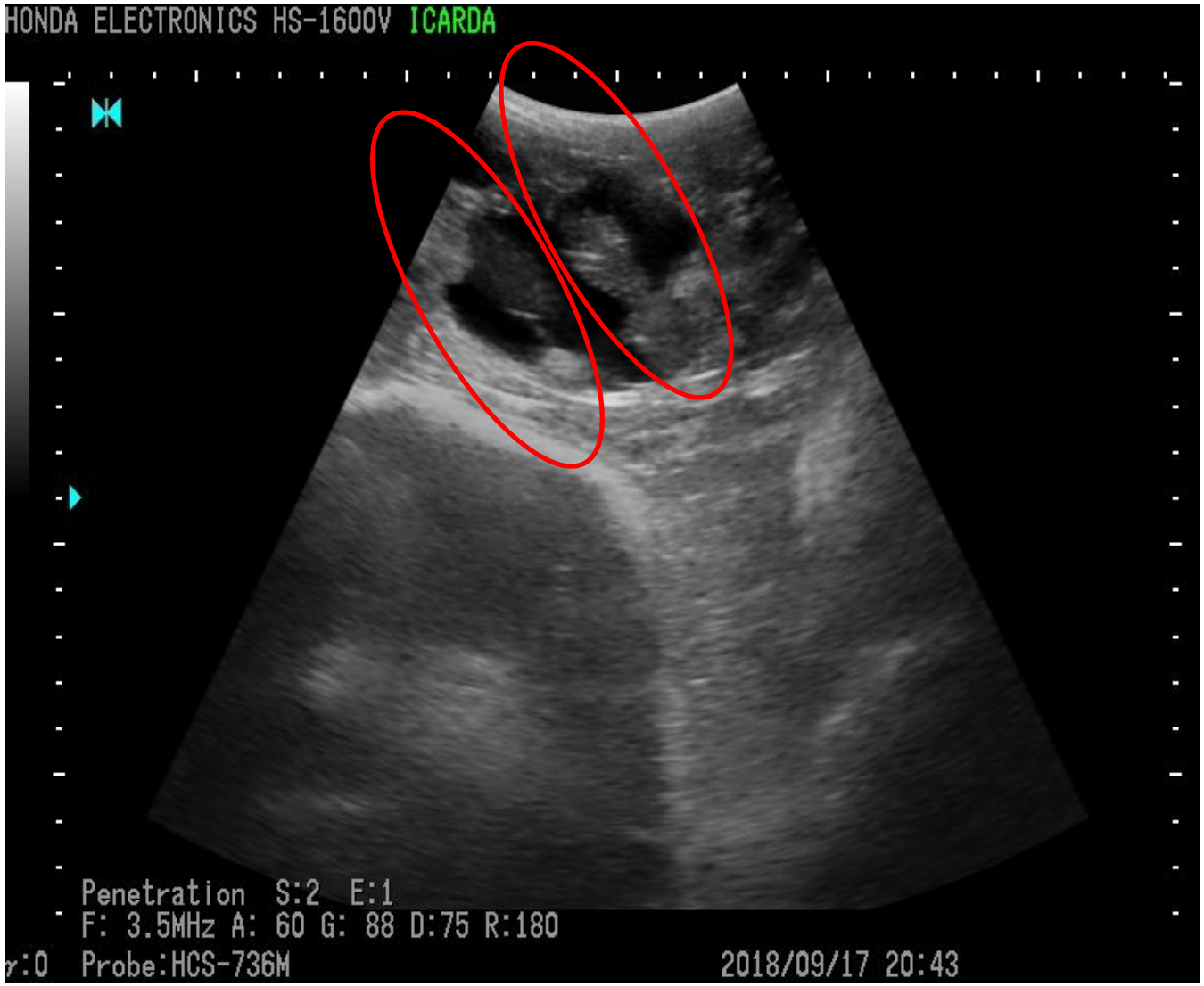
40-45 days

Multiple Fetus



40-45 days

Growth, Development and Differentiation

50-60 days

Main structures

- Placentomes are visible in 100 % of cases

Complementary structures

- Leg, head, spine.
- The heart contractility can be seen between the ribs during examination.
- Clear heart beat

50-60 days


HONDA ELECTRONICS HS-1600V ICARDA
Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
γ:0 Probe:HCS-736M
2018/10/03 16:07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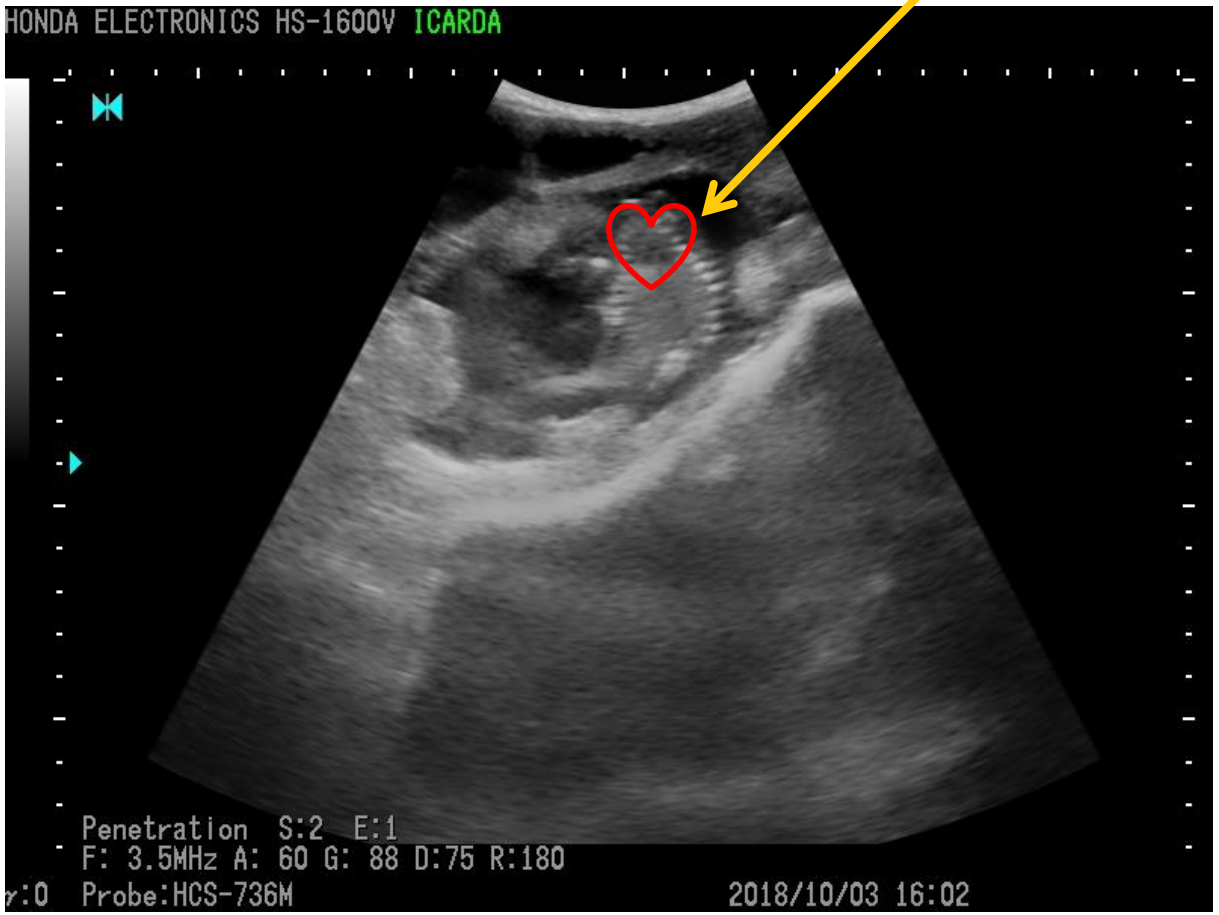
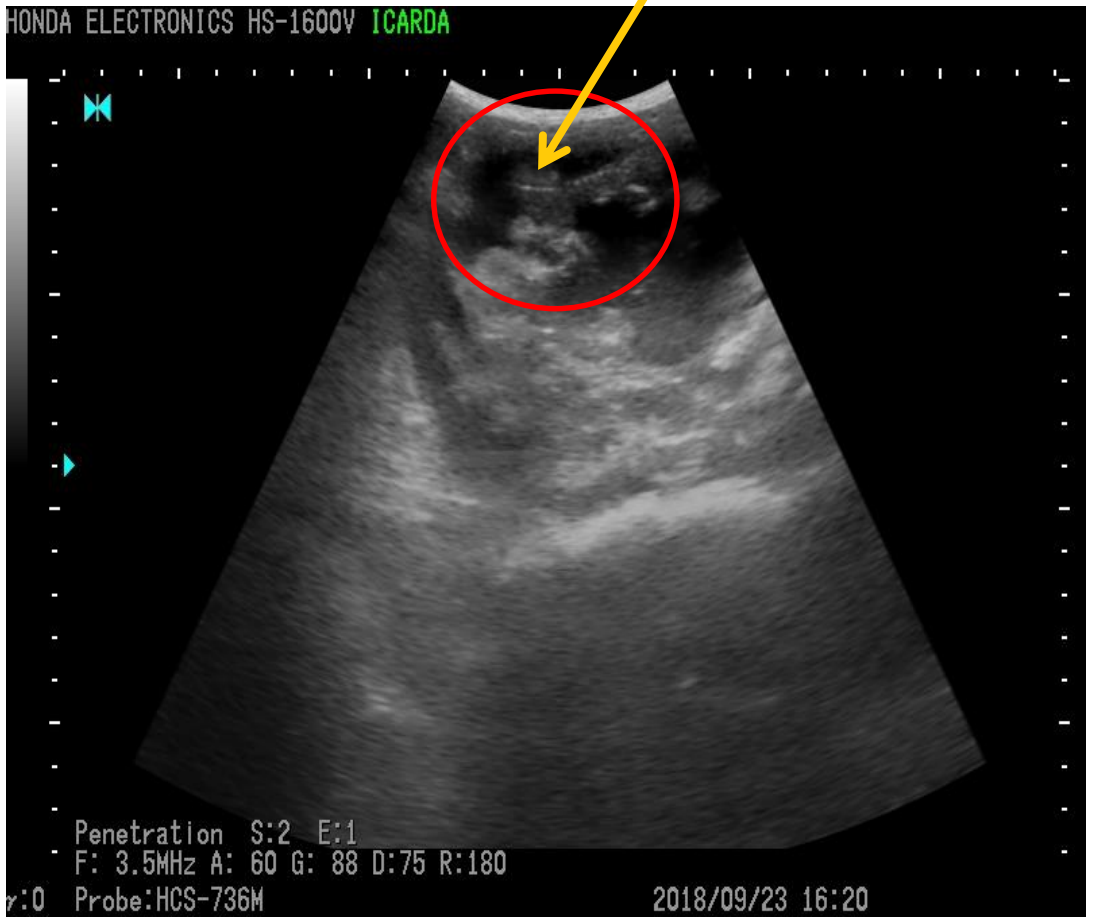
Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
γ:0 Probe:HCS-736M
2018/10/03 16:07

50-60 days

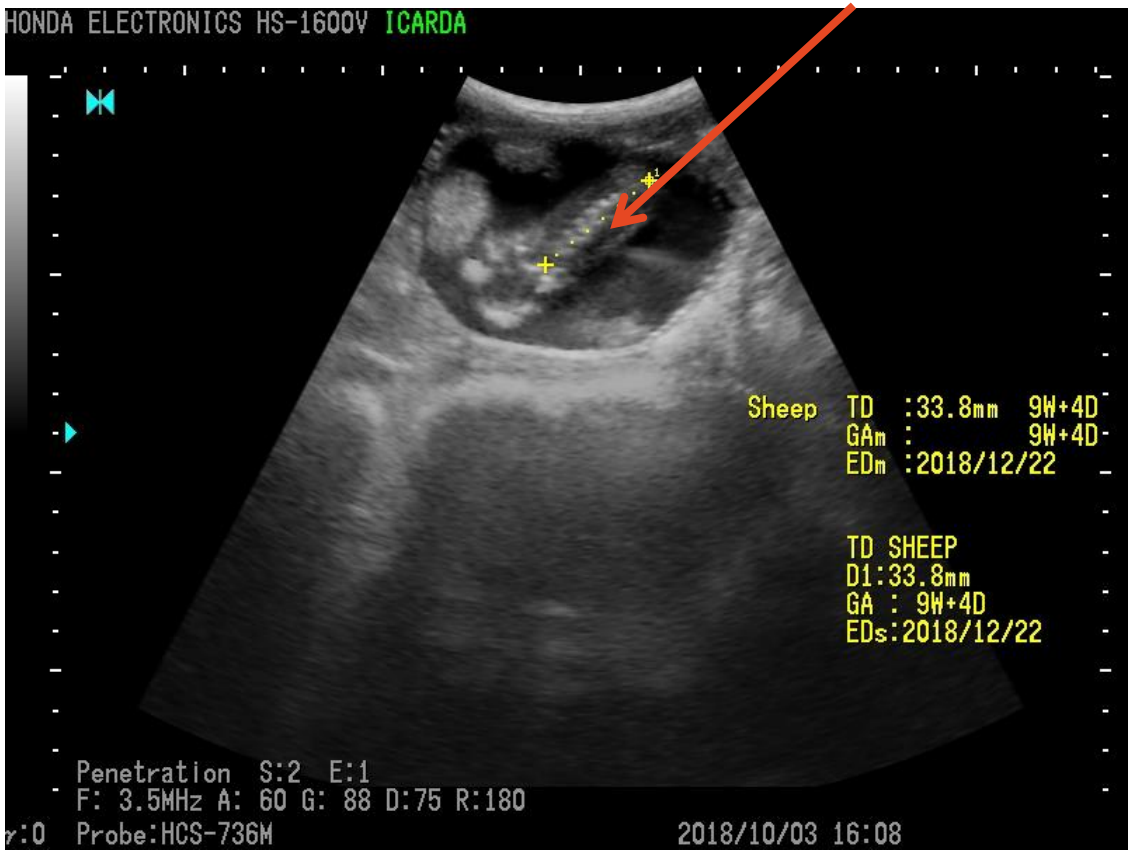
Clear heart beat



Bone appears highly echonic (white)



50-60 days


HONDA ELECTRONICS HS-1600V ICARDA
Sheep TD :33.8mm 9W+4D
GAm : 9W+4D
EDm :2018/12/22
TD SHEEP
D1:33.8mm
GA : 9W+4D
EDs:2018/12/22
Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
γ:0 Probe:HCS-736M
2018/10/03 16:08


HONDA ELECTRONICS HS-1600V ICARDA
Sheep TD :33.8mm 9W+4D
Sheep HD :31.6mm 9W+4D
GAm : 9W+4D
EDm :2018/12/22
HD SHEEP
D1:31.6mm
GA : 9W+4D
EDs:2018/12/22
Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
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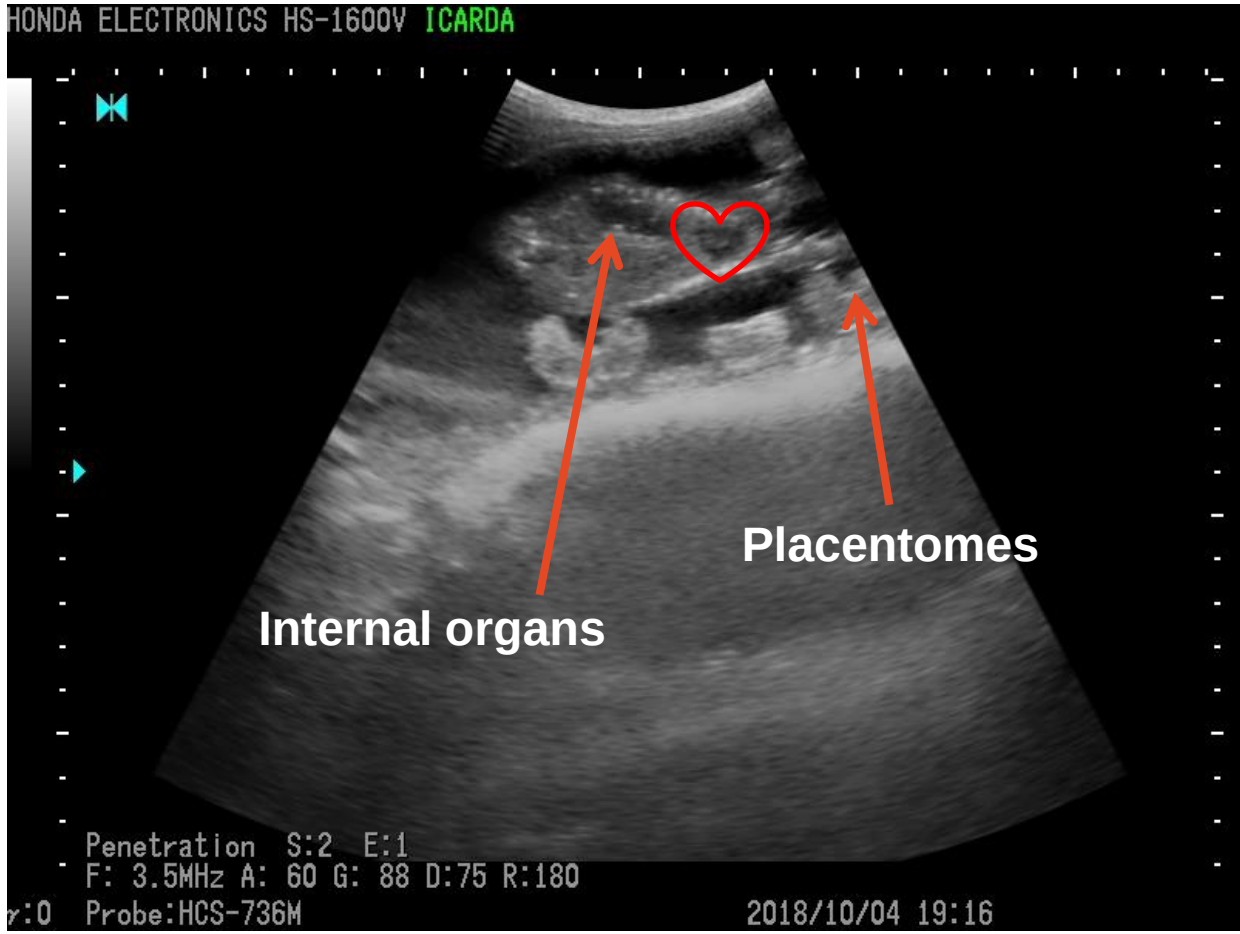
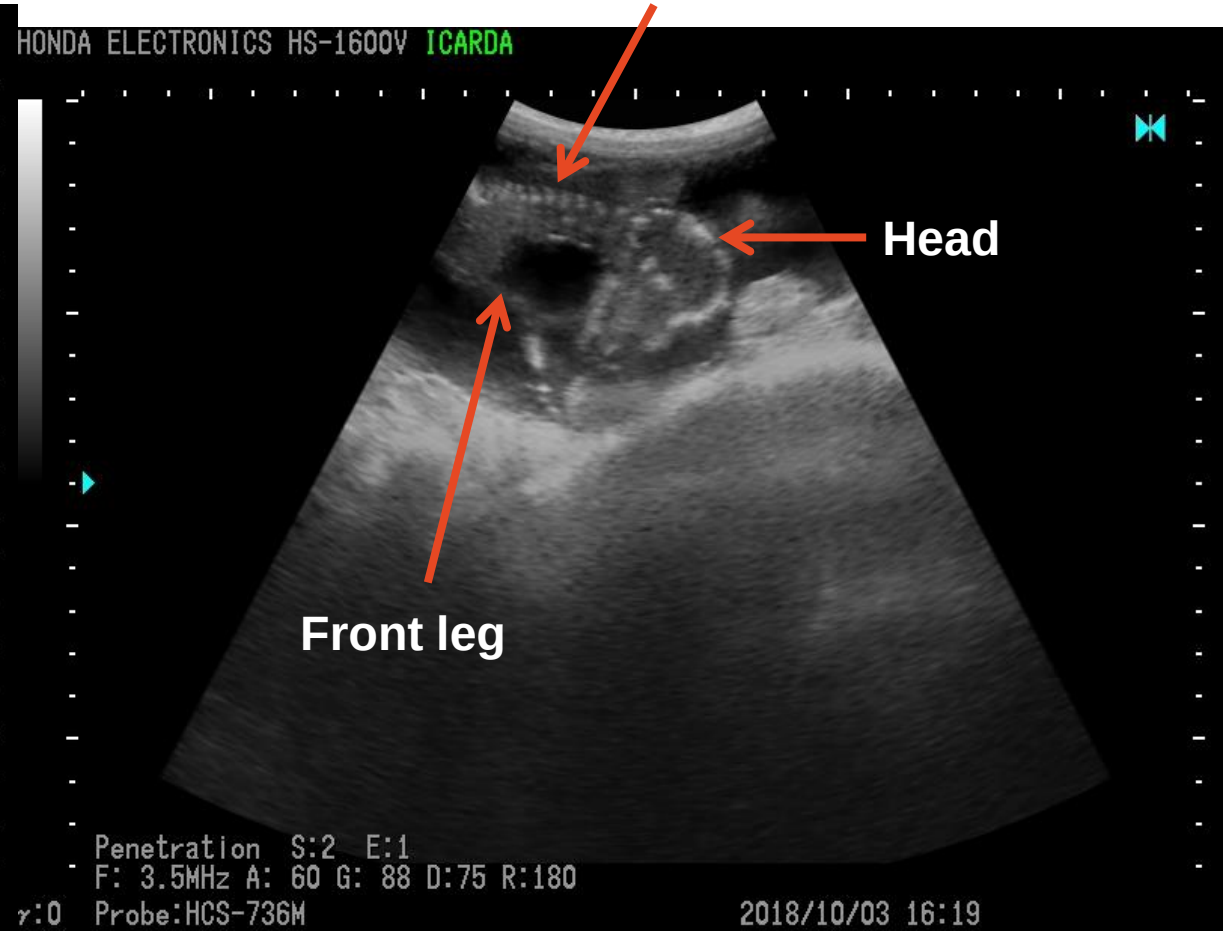
50-60 days


HONDA ELECTRONICS HS-1600V ICARDA
Placentomes
Internal organs
Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
Probe:HCS-736M
2018/10/04 19:16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Head
Front leg
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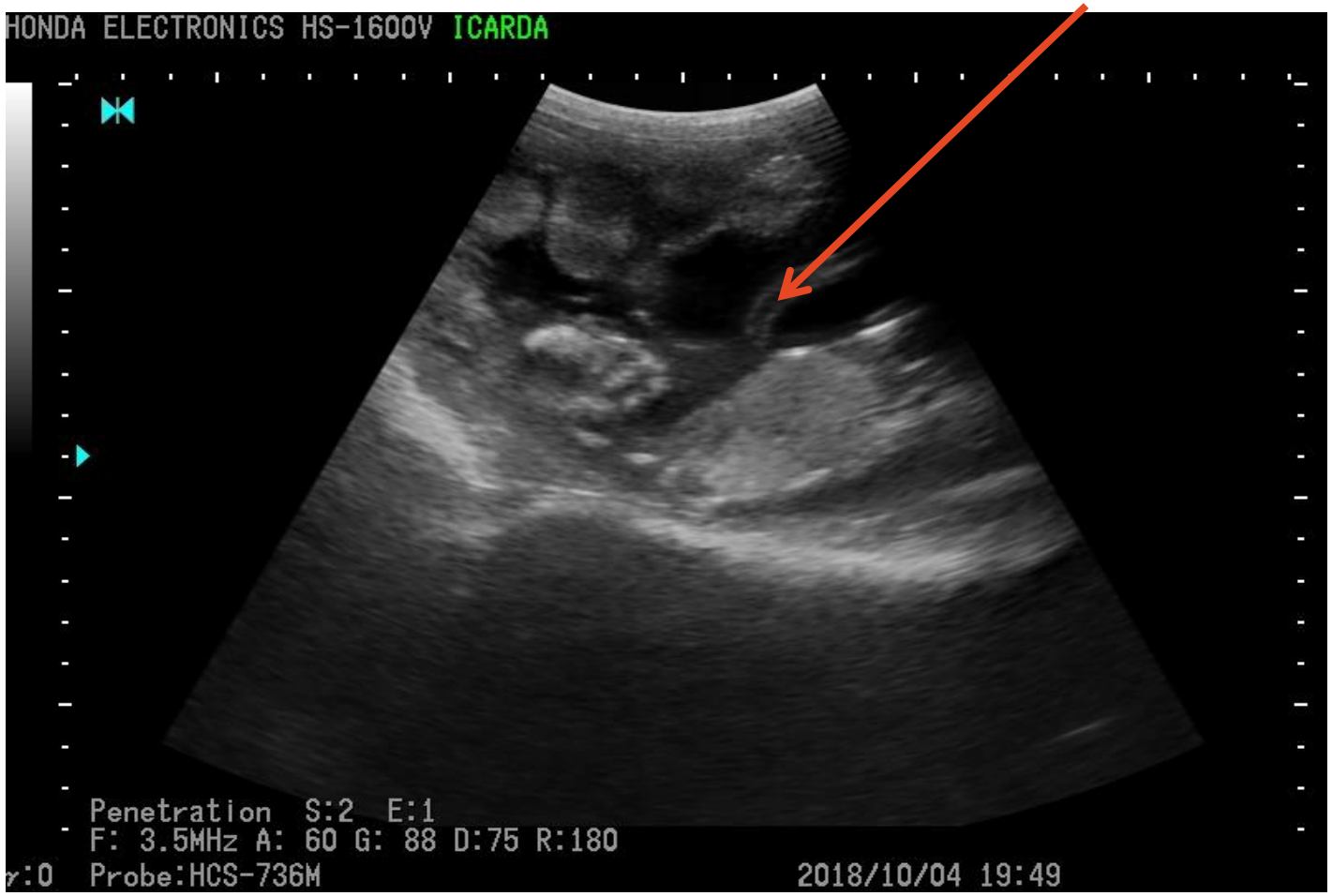
50-60 days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Penetration S:2 E:1
F: 3.5MHz A: 60 G: 88 D:75 R:180
γ:0 Probe:HCS-736M
2018/10/04 19:49

75-90 days

Main structures

- Placentomes grow in size
- Fetus organ: Vertebral column, ribs, internal organs, head, legs, heart .
- Clear heart beat.
- fetuses become too large to be consistently visualized

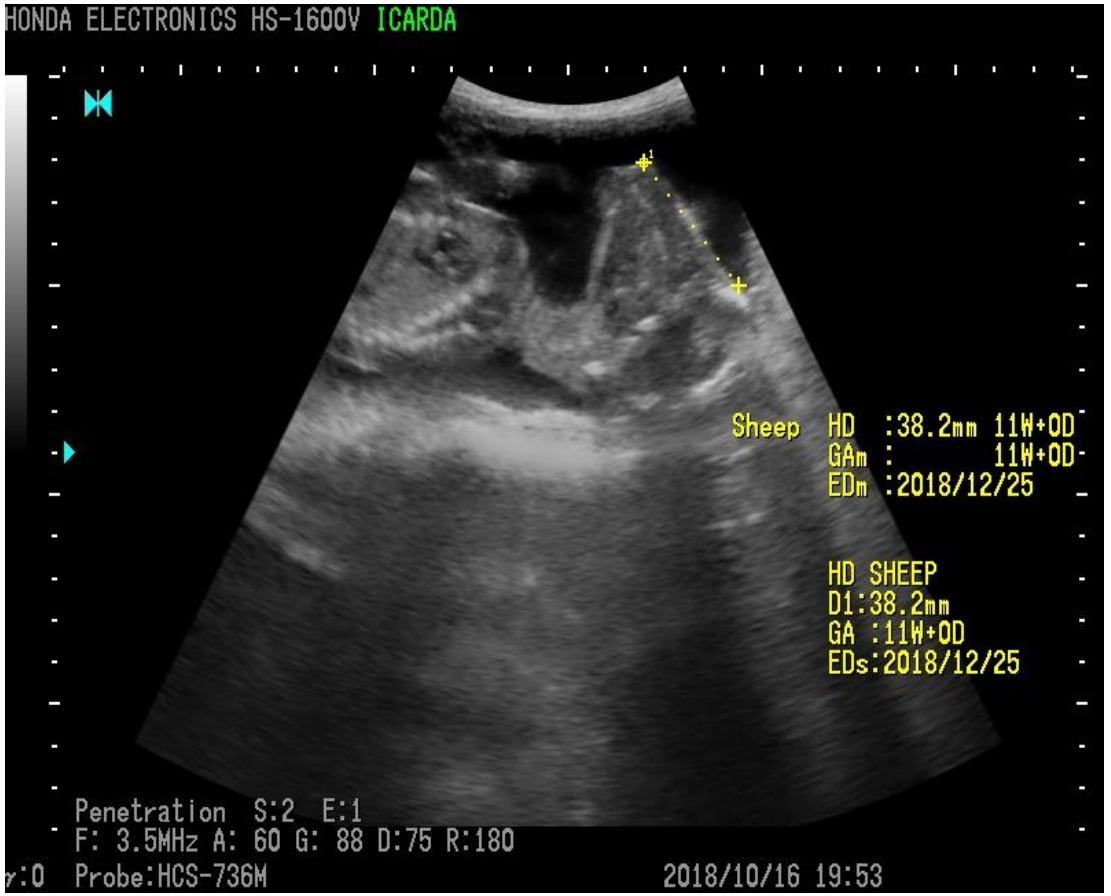
Complementary structures

- Multiple fetuses are difficult to distinguish
- Internal organs: lungs-liver-stomach

75-90 days

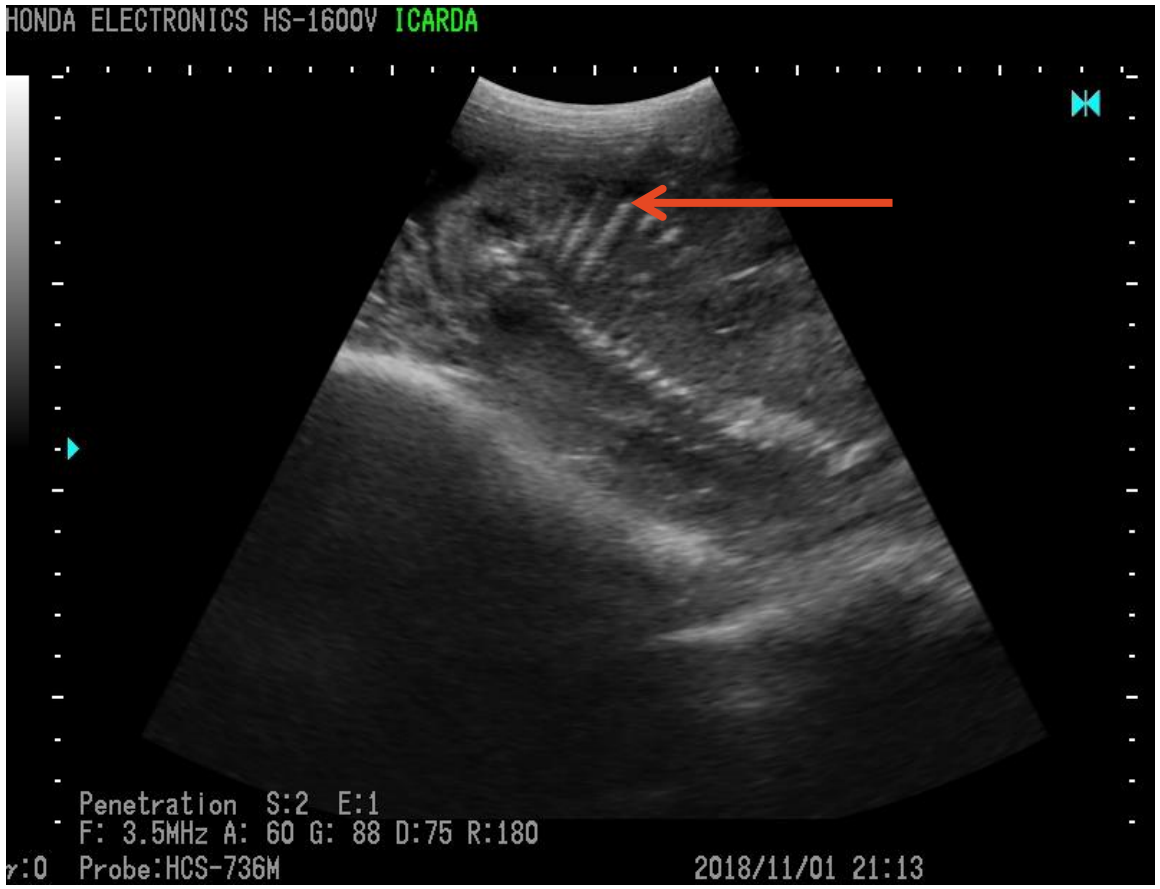
Placentomes grow in size

75-90 days

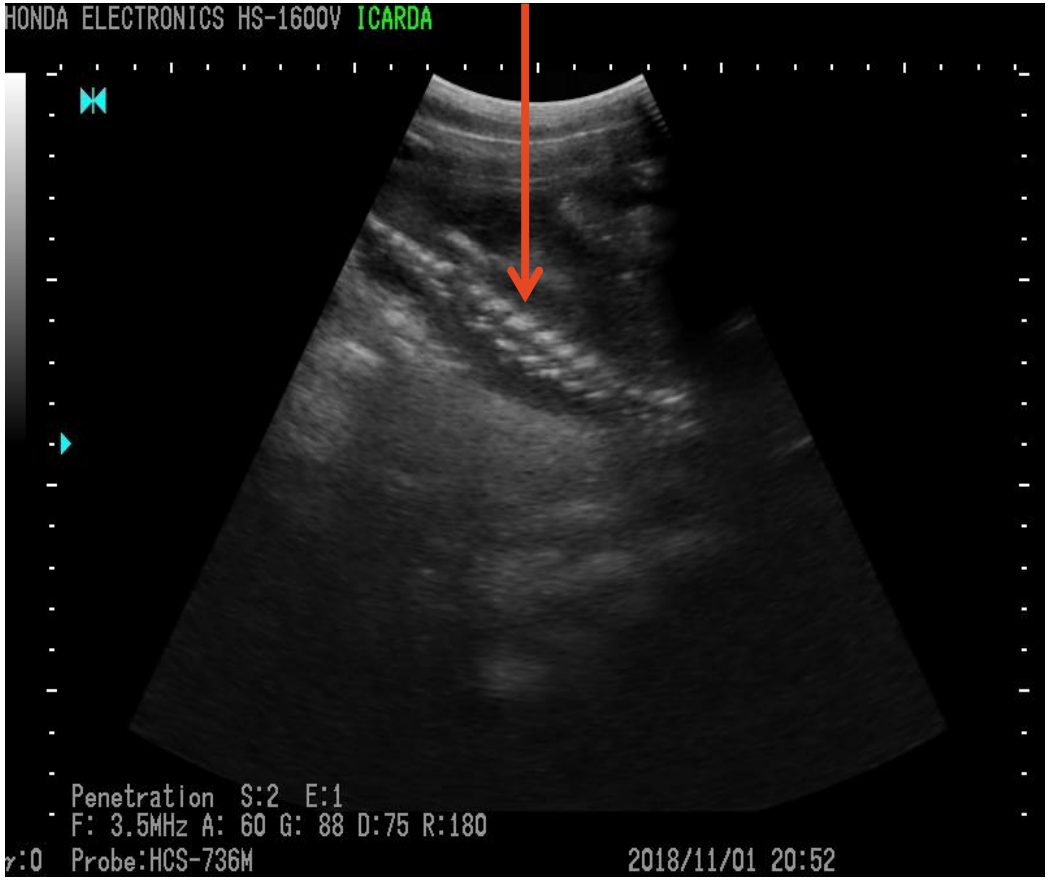


Fetuses are too large and too far within the abdominal cavity to distinguish between single and multiple pregnancies

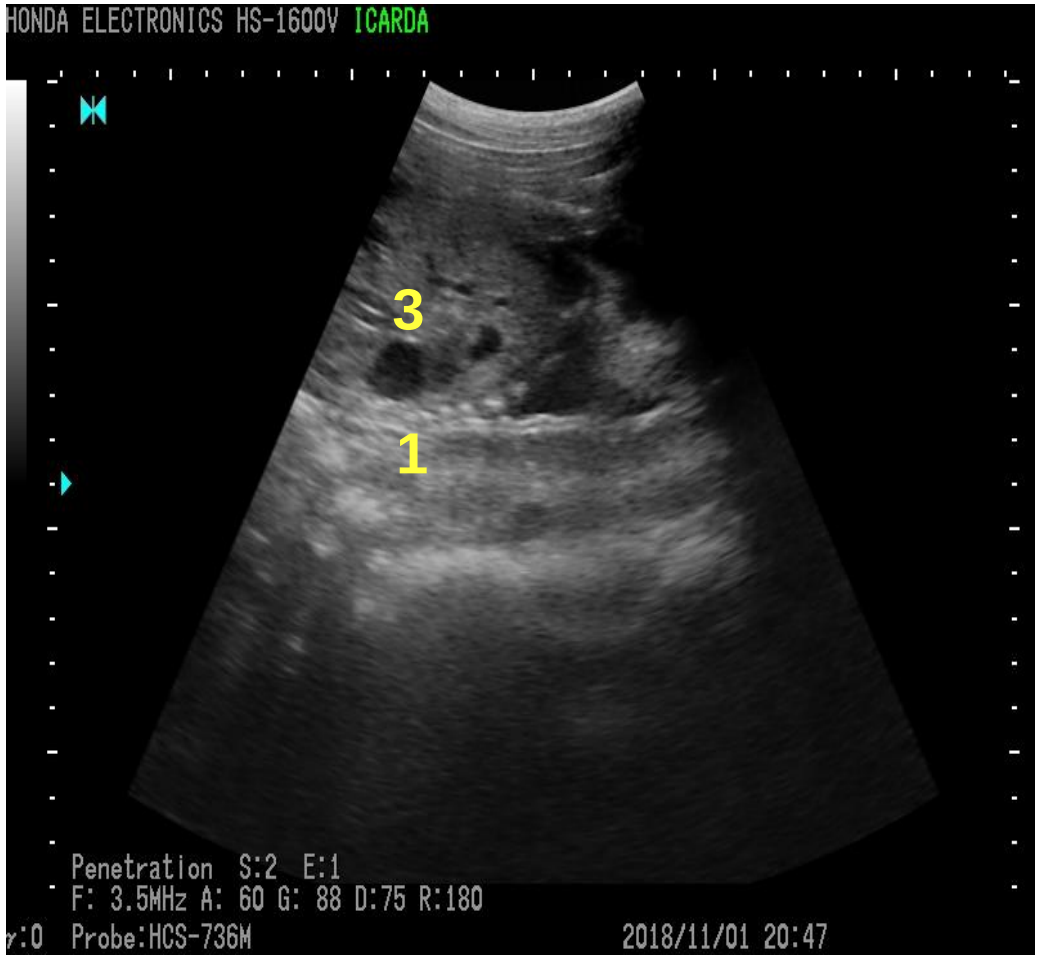
75-90 days

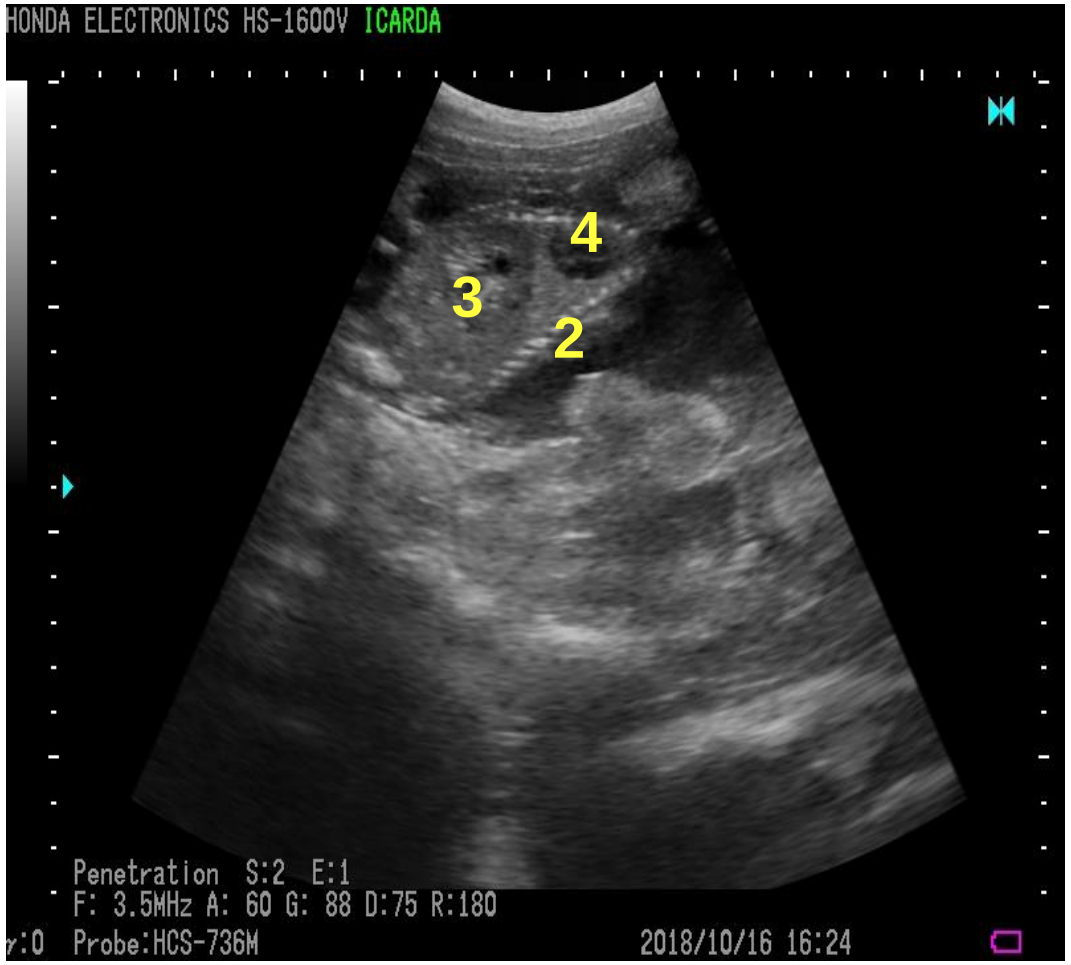


Spine



75-90 days

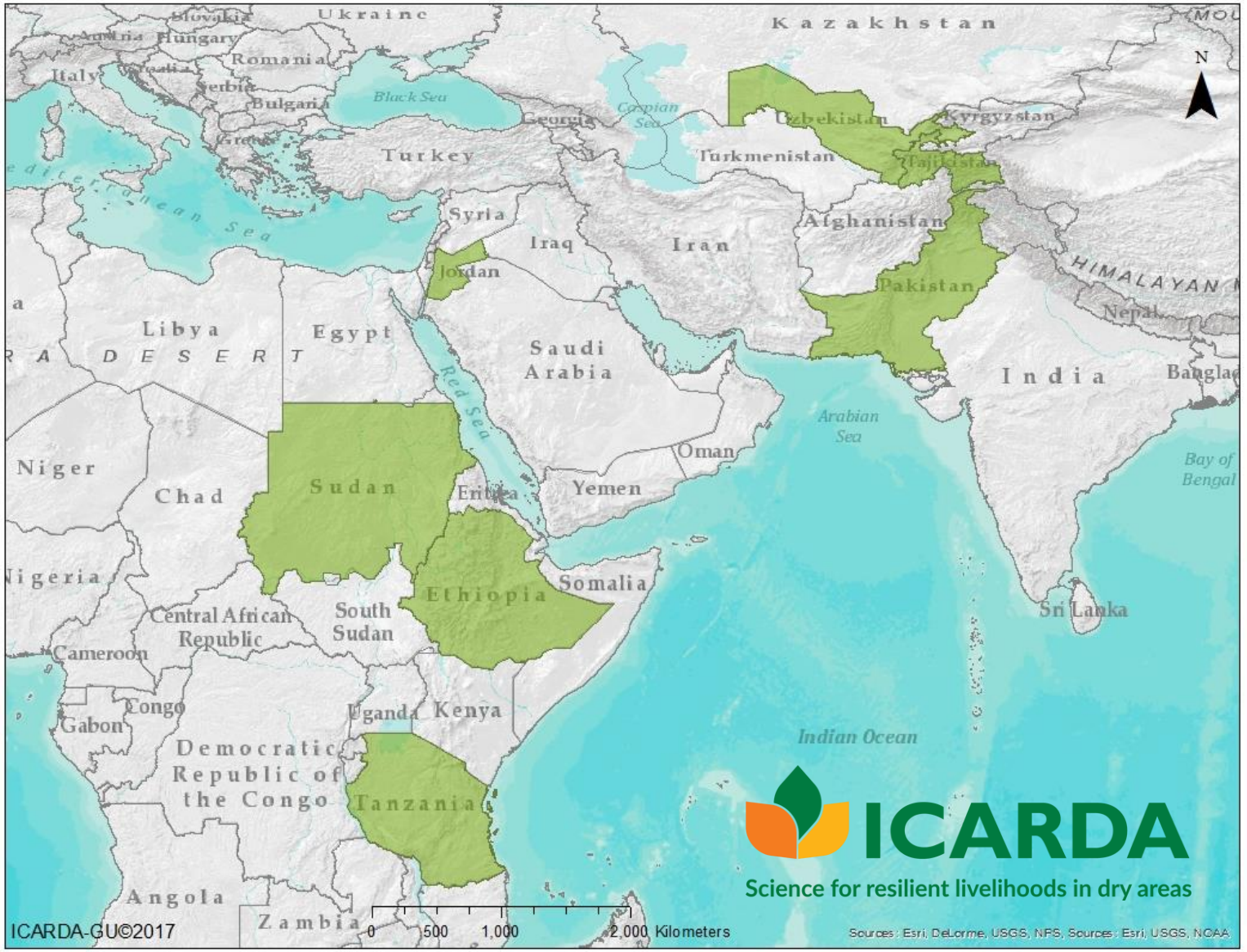




Fetal organs

1 Vertebral column
2 Ribs
3 Internal organs
4 Heart

Pregnancy Diagnosis Service Provision:
Ultrasound-based tool to manage sheep and goats' reproduction



CGIAR Research Program on Livestock

Contact: Mourad Rekik; M.Rekik@cigar.org

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Enabling poor rural people to overcome poverty

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The **CGIAR Research Program on Livestock** aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world.