1. Query to obtain the livestock id that has the highest sale price

   livestock_id $\Im$ MAX sale_price (Livestock)

2. Query to obtain the health status of John Smith's livestock with a visit to the vet

   LivestockWithVisit ← Livestock $\bowtie_{livestock\_id=animal\_id}$ (VetVisit)
   UsersLivestockWithVisit ← LiveStockWithVisit $\bowtie_{owner\_id=user\_id}$ (Users)
   JohnsLivestock ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith'}$ (UsersLivestockWithVisit)
   $\Pi_{health\_status,livestock\_id}$ (JohnsLivestock)

3. Query to obtain John Smith's livestock that are on medication and what that medication is

   LivestockOnMeds ← Livestock $\bowtie_{Livestock.livestock\_id=Medical.livestock\_id}$ (Medical)

   UsersWithLivestockOnMeds ← Users $\bowtie_{user\_id=owner\_id}$ (LivestockOnMeds)

   JohnsLivestock ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith'}$ (UsersWithLivestockOnMeds)

   $\Pi_{health\_status,livestock\_id,medication\_name,start\_date,end\_date}$ (JohnsLivestock)

4. Query to obtain all livestock that are unhealthy for John Smith

   UnhealthyLivestock ← $\sigma_{health\_status='H'}$ (Livestock)

   UserLivestock ← Users $\bowtie_{user\_id=owner\_id}$ (UnhealthyLivestock)

   JohnsUnhealthyLivestock ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith'}$ (UserLivestock)

   $\Pi_{sale\_price,livestock\_id,location,weight,notes,born\_date}$(JohnsUnhealthyLivestock)

5. Query to get all the cattle born between January 1st, 2018 and February 12th, 2019

   $\sigma_{born\_date>\text{'2018-1-1'} \text{ and } born\_date<\text{'2019-12-2'}}$

6. Query to get all of John Smith's livestock that have had that the "Madcow" vaccine

   LivestockWithVaccines ← Livestock $\bowtie_{livestock\_id=animal\_id}$ (Vaccinations)

   UsersWithLivestock ← Users $\bowtie_{user\_id=owner\_id}$ (LivestockWithVaccines)

JohnsLivestock ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith' \text{ and } type='Madcow'}$ (UsersWithLivestock)

$\Pi_{cattle\_id,type,health\_status}$ (JohnsLivestock)

7. Query to get all of John Smith's livestock that are sick and each one's medication

   Sick ← $\sigma_{health\_status='H'}$ (Livestock)

   UserSickMedical ← User $\bowtie_{user\_id=owner\_id} (\text{Sick} \bowtie_{Livestock.livestock\_id=Medical.livestock\_id} \text{Medical})$

   JohnsSickWithMedical ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith'}$(UserSickMedical)

   $\Pi_{livestock\_id,health\_status,medication\_name}$(JohnsSickWithMedical)

8. Query to get all livestock on a specific pasture nicknamed "Mars"

   LivestockPasture ← Livestock $\bowtie_{location=pasture\_id}$ (Pastures)

   Specific ← $\sigma_{nickname='Mars'}$ (LivestockPasture)

   $\Pi_{livestock\_id,nickname}$ (Specific)

9. Query to get average pasture maintenance cost for John Smith

   UserPastures ← User $\bowtie_{user\_id=owner\_id}$ (Pastures)

   PasturesWithMaintenance ← UserPastures $\bowtie_{Pastures.pasture\_id=Pasture\_Maintenance.pasture\_id}$ (Pasture_Maintenance)

   JohnSmithsPastures ← $\sigma_{first\_name='John' \text{ and } last\_name='Smith'}$ (PasturesWithMaintenance)

   nickname $\Im$ AVERAGE cost (JohnSmithsPastures)