

# Appendix

## Summary of COVID-19 impacts on U.S. Aquaponics

### Quarter 1 Results

*Jonathan van Senten, Virginia Tech*

*Matthew A. Smith, The Ohio State University*

*Carole R. Engle, Engle-Stone Aquatics, LLC, Virginia Tech*



**Contents**

Q1. Has your farm or business been impacted by the coronavirus disease (COVID-19)? ..... 5

Q1.1. Does your farm or business expect to be affected by the coronavirus disease (COVID-19) in 2020?5

Q2. Has your farm or business had government (state or federal) contracts canceled for 2020 because of the coronavirus disease (COVID-19)?..... 6

Q3. Has your farm or business had private contracts / orders canceled for 2020 because of the coronavirus disease (COVID-19)?..... 6

Q4. Has your farm or business had to lay off any employees due to the coronavirus disease (COVID-19)? ..... 7

Q4.1. Are any of the employees that your farm or business had to, or will have to, lay off due to the coronavirus disease (COVID-19) designated as "Short-Time" or "Shared-Work" employees?..... 7

Q4.2. How many employees has your farm or business had to lay off in response to the coronavirus disease (COVID-19)?..... 8

Q4.3. How many weeks before your farm or business will have to make a decision to lay off employees, in response to the coronavirus disease (COVID-19)?..... 8

Q4.4. How many employees do you estimate your farm or business will have to lay off in response to the coronavirus disease (COVID-19)?..... 9

Q5. Has your farm or business had any employees miss work due to the coronavirus disease (COVID-19)? ..... 9

Q5.1. In total, approximately how many days have any employees in your farm or business missed work due to the coronavirus disease (COVID-19)? ..... 10

Q6. Does your farm or business make use of H2A or H2B workers? ..... 10

Q6.2. Is your farm or business currently at risk of losing H2A or H2B workers due to the coronavirus disease (COVID-19) pandemic? ..... 11

Q7. Has your farm or business experienced any of the following as a result of the coronavirus disease (COVID-19) in 2020? Please select all that apply. .... 11

Q7.1. Has your farm or business experienced lost sales to international or export markets (outside of the United States), as a result of the coronavirus disease (COVID-19)? ..... 12

Q7.2. If your farm or business has experienced lost sales as a result of the coronavirus disease (COVID-19), please estimate the value of lost sales? ..... 13

Q7.3. If your farm or business has experienced production challenges (not related to labor) as a result of the coronavirus disease (COVID-19), can those challenges be specified? Please select all that apply. .... 14

Q7.6. If your farm or business has experienced increased demand for products as a result of the coronavirus disease (COVID-19), please estimate the value of those effects on sales? ..... 15

Q8. Does your farm or business expect to experience any of the following as a result of the coronavirus disease (COVID-19) in 2020? Please select all that apply. .... 16

Q8.1. Does your farm or business expect to experience lost sales to international or export markets (outside of the United States), as a result of the coronavirus disease (COVID-19)? ..... 16

Q8.2. Does your farm or business expect to experience lost sales as a result of the coronavirus disease (COVID-19), please estimate the value of lost sales?.....	17
Q8.3. Does your farm or business expect to experience production challenges (not related to labor) as a result of the coronavirus disease (COVID-19), can those challenges be specified? Please select all that apply.....	18
Q8.6. Does your farm or business expect to experience increased demand for products as a result of the coronavirus disease (COVID-19), please estimate the value of those effects on sales? .....	19
Q9. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 3 (three) months?.....	20
Q10. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 6 (six) months? .....	20
Q11. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 12 (twelve) months? .....	21
Q12. How many months can your farm or business survive without sales, as a result of the coronavirus disease (COVID-19), before suffering longer term cash flow effects?.....	21
Q13. Will holding market ready product, as a result of the coronavirus disease (COVID-19), make it less marketable?.....	22
Q13.1. Will holding market ready product, as a result of the coronavirus disease (COVID-19), result in: Please select all that apply. ....	22
Q14. How many months can your farm or business hold market ready product, as a result of the coronavirus disease (COVID-19), before it becomes an issue for new crops or planting? .....	23
Q16. Are there specific steps or types of assistance that would increase the likelihood for your farm or business to survive? Please select all that apply. ....	23
Q17. Would assistance with any of the following be helpful to your farm or business right now? Please select all that apply.....	24
Q18. Are there any existing programs that your aquaculture, aquaponics, or allied business does not currently qualify for, that would increase the likelihood of survival of your farm or business? .....	24
Q19. What is the primary product that your farm or business produces? .....	25
Q19.1. Please indicate which is the major species of foodfish raised by your farm or business:.....	26
Q20. How does your farm or business primarily market or sell aquaculture / aquaponics products? .....	27
Q21. Please indicate the scale of your farm or business by annual sales volume before the effects of coronavirus disease (COVID-19): .....	28
Q22. In which USDA defined Aquaculture Region is your farm or business located?.....	29

## Overview

On March 23<sup>rd</sup>, 2020 Virginia Tech Seafood AREC and The Ohio State University Extension initiated an online survey of the U.S. aquaculture, aquaponics, and allied businesses. This survey was designed to capture and quantify the effects of the coronavirus disease (COVID-19) on the aquaculture, aquaponics, and allied industries. The survey closed April 10<sup>th</sup>, 2020 at 11:59 pm. The survey will be distributed at the conclusion of every quarter for 2020, to attempt to capture the evolving impacts of COVID-19 over time.

Survey methods are detailed in the Virginia Cooperative Extension Fact Sheet VCE-AAEC-218, available at: [https://www.arec.vaes.vt.edu/arec/virginia-seafood/research/Impacts\\_of\\_COVID19.html](https://www.arec.vaes.vt.edu/arec/virginia-seafood/research/Impacts_of_COVID19.html).

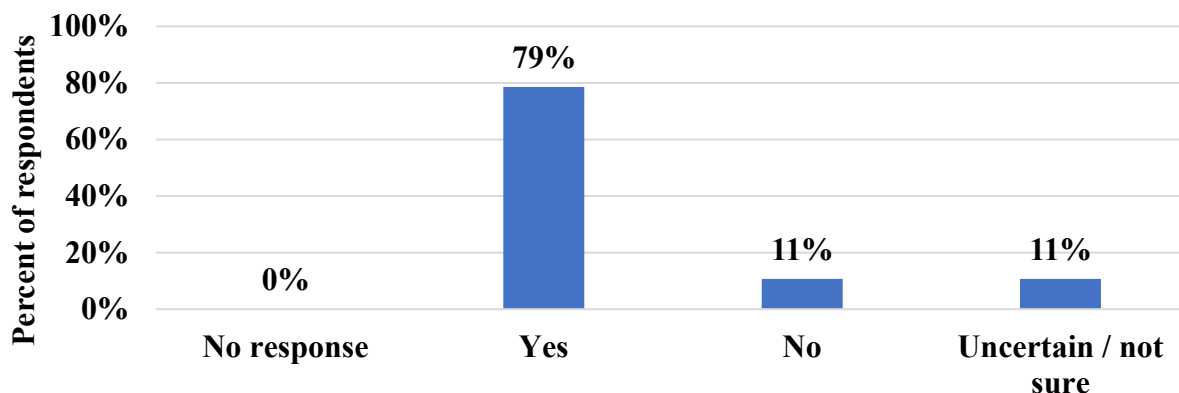
The aquaponics results from the Q1 survey have significant overlap with the **Tilapia Quarter 1 Results**, 82% of aquaponics respondents raised tilapia as foodfish. Therefore we refer readers to the [tilapia](#) report for additional details and information.

## Survey results for each question

The number of respondents to each question presented in this summary is denoted as (n = ).

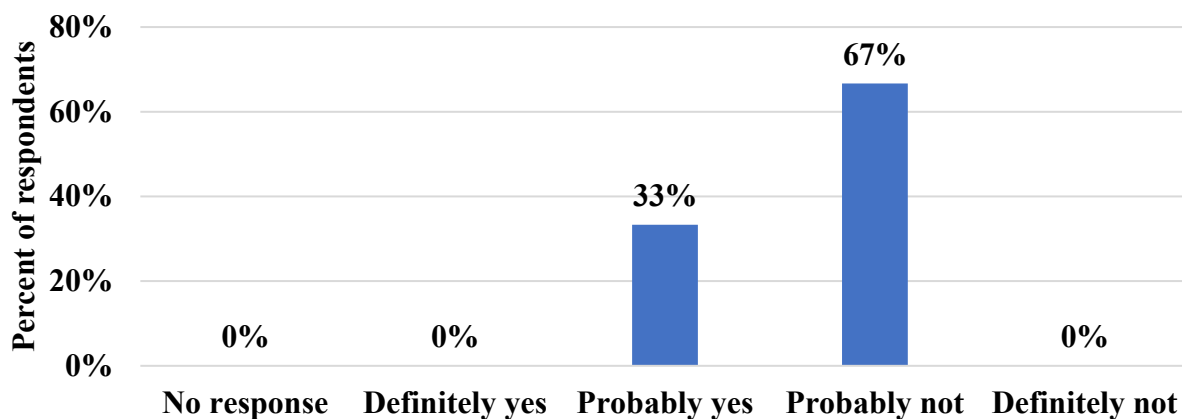
### Q1. Has your farm or business been impacted by the coronavirus disease (COVID-19)? (n = 28)

- No response : 0%
- Yes : 79%
- No : 11%
- Uncertain / Not Sure : 11%



### Q1.1. Does your farm or business expect to be affected by the coronavirus disease (COVID-19) in 2020? (n = 6)

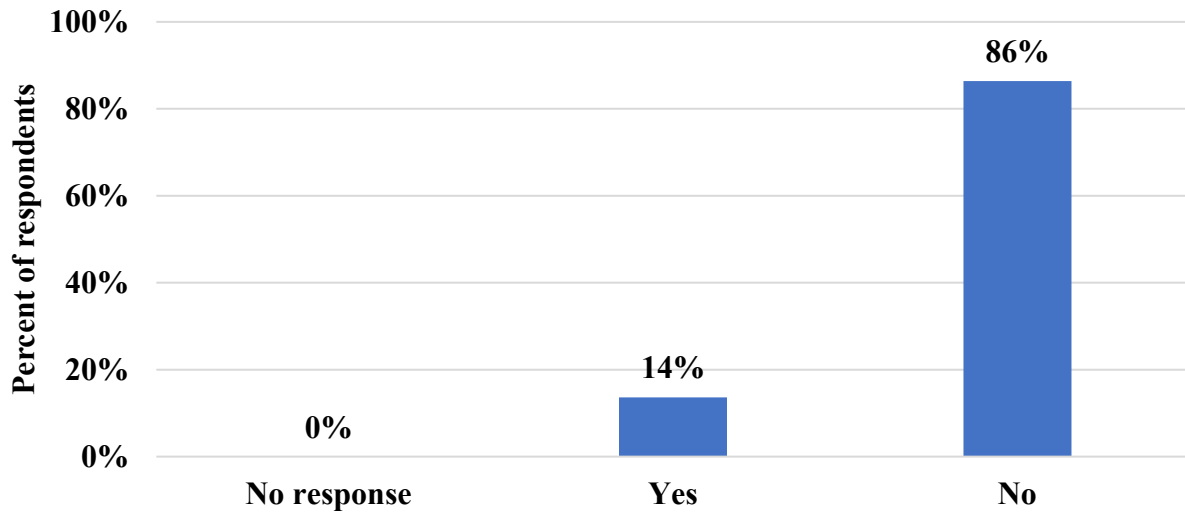
- No response : 0%
- Definitely yes : 0%
- Probably yes : 33%
- Probably not : 67%
- Definitely not : 0%



**Q2. Has your farm or business had government (state or federal) contracts canceled for 2020 because of the coronavirus disease (COVID-19)?**

(n = 22)

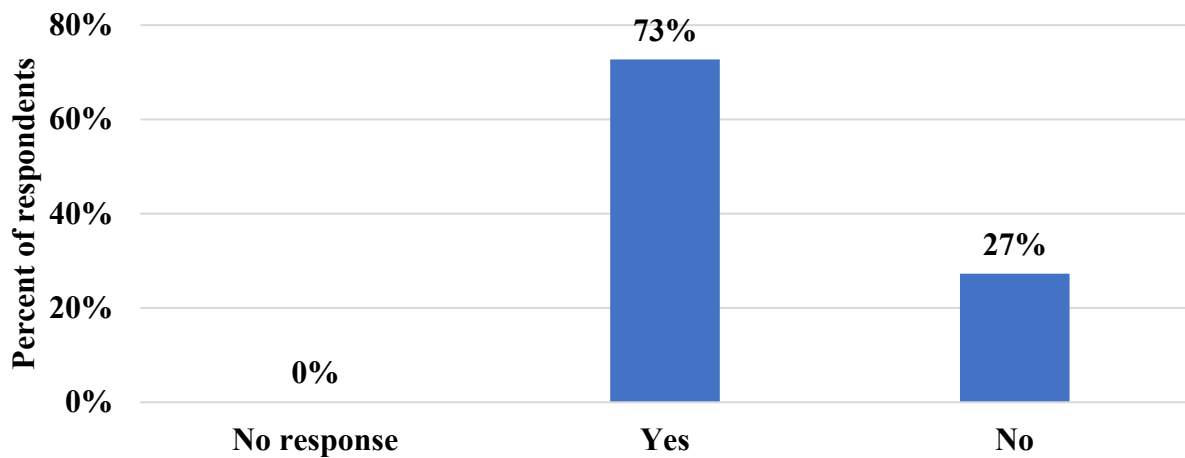
- No response : 0%
- Yes : 14%
- No : 86%



**Q3. Has your farm or business had private contracts / orders canceled for 2020 because of the coronavirus disease (COVID-19)?**

(n = 22)

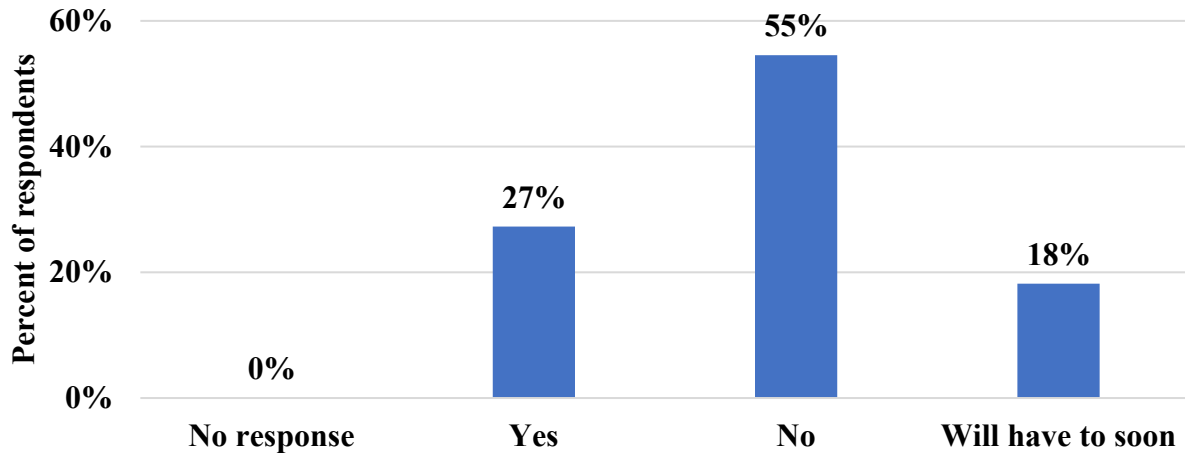
- No response : 0%
- Yes : 73%
- No : 27%



**Q4. Has your farm or business had to lay off any employees due to the coronavirus disease (COVID-19)?**

(n = 22)

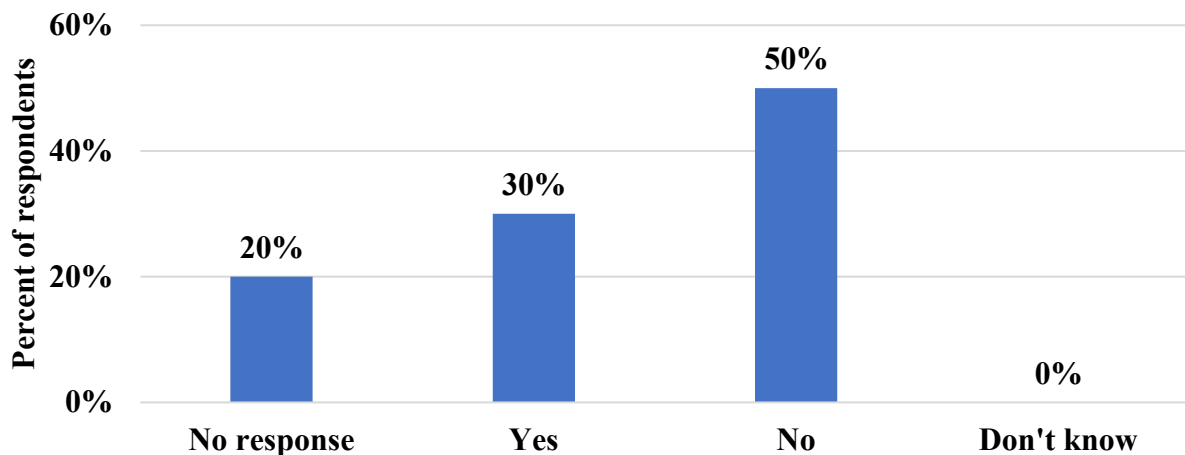
- No response : 0%
- Yes : 27%
- No : 55%
- Will have to soon : 18%



**Q4.1. Are any of the employees that your farm or business had to, or will have to, lay off due to the coronavirus disease (COVID-19) designated as "Short-Time" or "Shared-Work" employees?**

(n = 10)

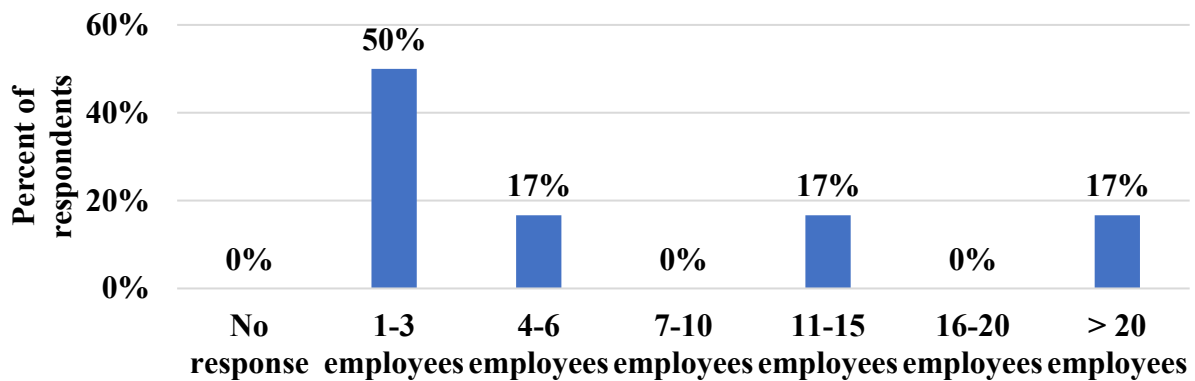
- No response : 20%
- Yes : 30%
- No : 50%
- Don't know : 0%



**Q4.2. How many employees has your farm or business had to lay off in response to the coronavirus disease (COVID-19)?**

(n = 6)

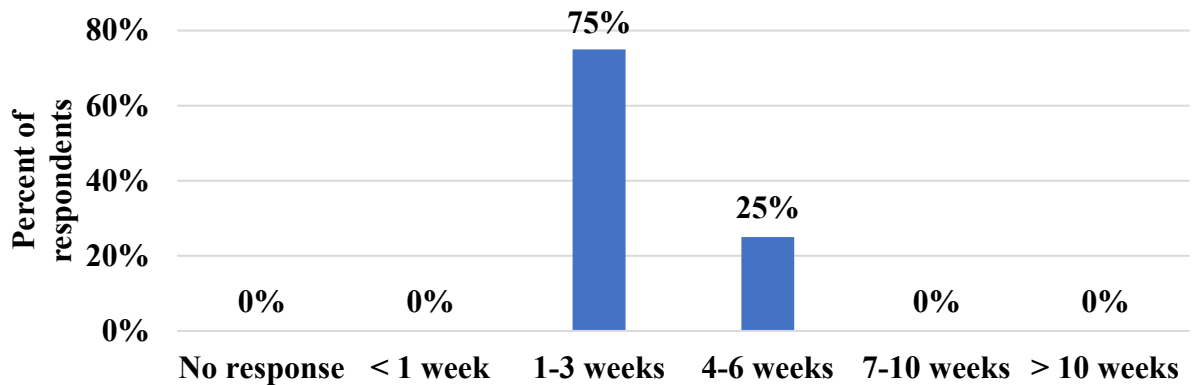
- No response : 0%
- 1 – 3 employees : 50%
- 4 – 6 employees : 17%
- 7 – 10 employees : 0%
- 11 – 15 employees : 17%
- 16 – 20 employees : 0%
- More than 20 employees : 17%



**Q4.3. How many weeks before your farm or business will have to make a decision to lay off employees, in response to the coronavirus disease (COVID-19)?**

(n = 4)

- No response : 0%
- Less than 1 week : 0%
- 1 – 3 weeks : 75%
- 4 – 6 weeks : 25%
- 7 – 10 weeks : 0%
- More than 10 weeks : 0%

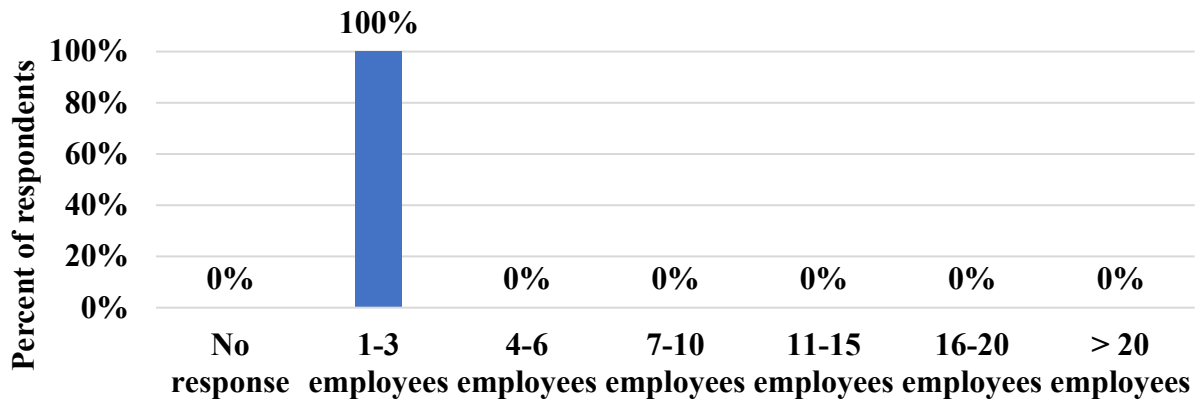




**Q4.4. How many employees do you estimate your farm or business will have to lay off in response to the coronavirus disease (COVID-19)?**

(n = 4)

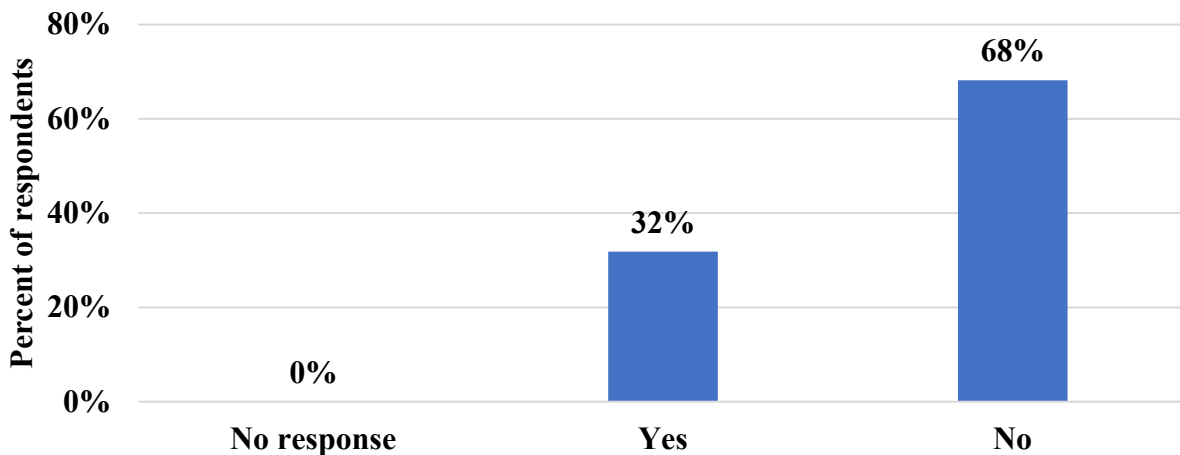
- No response : 0%
- 1 – 3 employees : 100%
- 4 – 6 employees : 0%
- 7 – 10 employees : 0%
- 11 – 15 employees : 0%
- 16 – 20 employees : 0%
- More than 20 employees : 0%



**Q5. Has your farm or business had any employees miss work due to the coronavirus disease (COVID-19)?**

(n = 22)

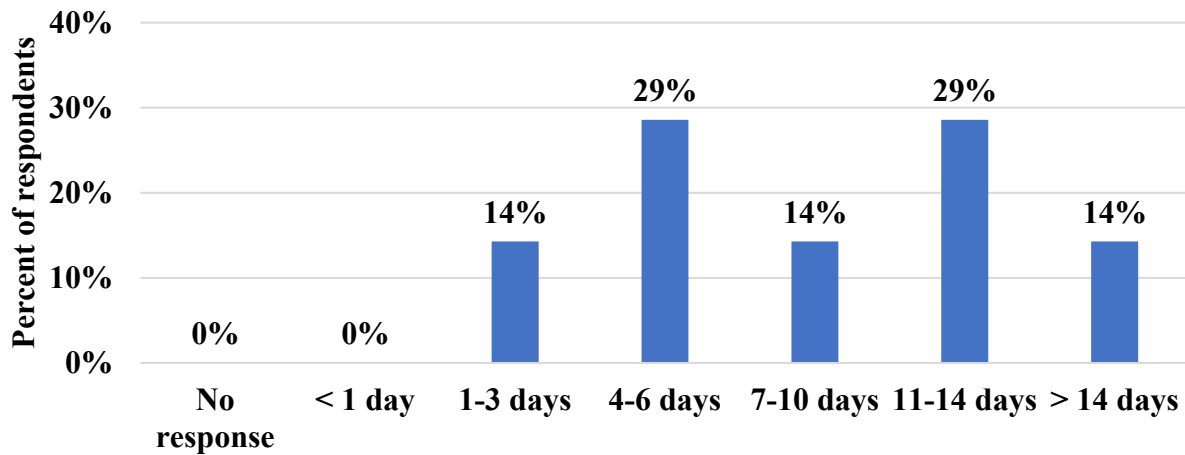
- No response : 0%
- Yes : 32%
- No : 68%



**Q5.1. In total, approximately how many days have any employees in your farm or business missed work due to the coronavirus disease (COVID-19)?**

(n = 7)

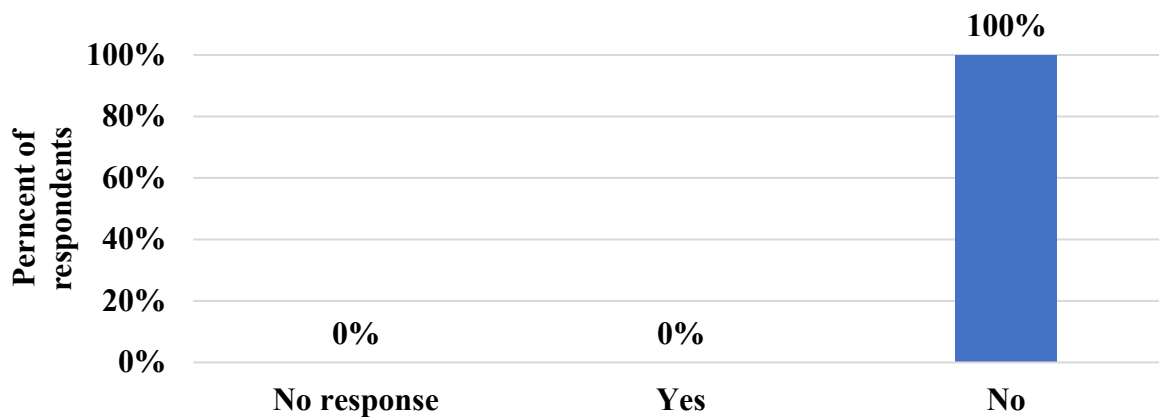
- No response : 0%
- Less than a day : 0%
- 1 -3 days : 14%
- 4 – 6 days : 29%
- 7 – 10 days : 14%
- 11 – 14 days : 29%
- More than 14 days : 14%



**Q6. Does your farm or business make use of H2A or H2B workers?**

(n = 22)

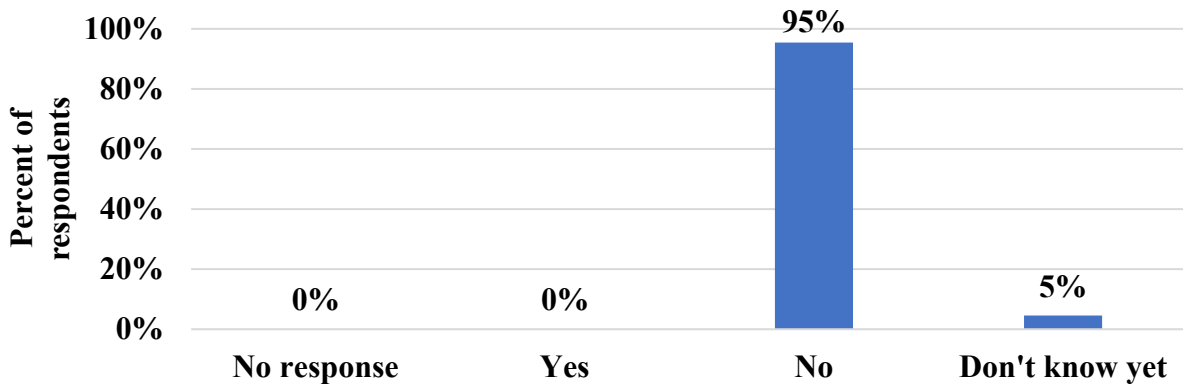
- No response : 0%
- Yes : 0%
- No : 100%



**Q6.2. Is your farm or business currently at risk of losing H2A or H2B workers due to the coronavirus disease (COVID-19) pandemic?**

(n = 22)

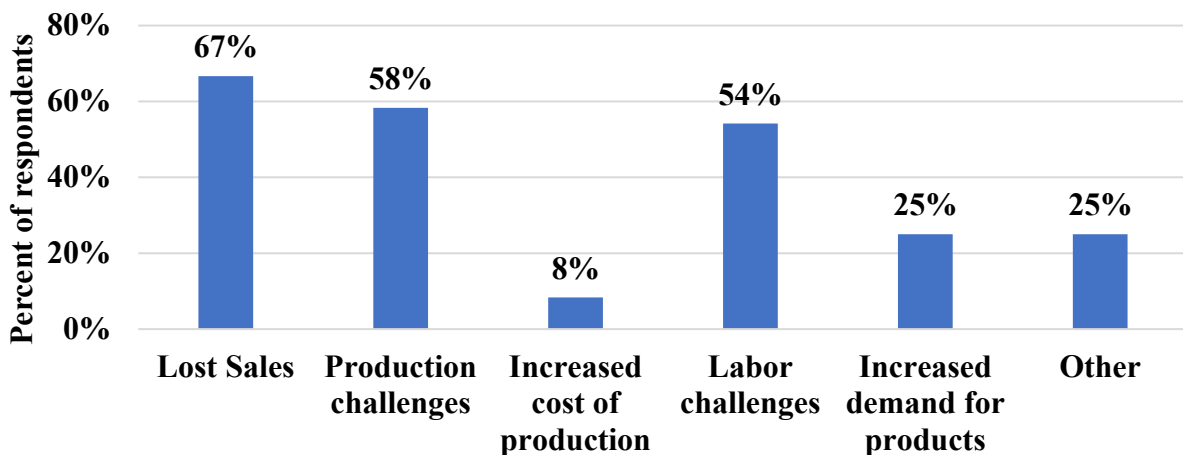
- No response : 0%
- Yes : 0%
- No : 95%
- Don't know yet : 5%



**Q7. Has your farm or business experienced any of the following as a result of the coronavirus disease (COVID-19) in 2020? Please select all that apply.**

(n = 24)

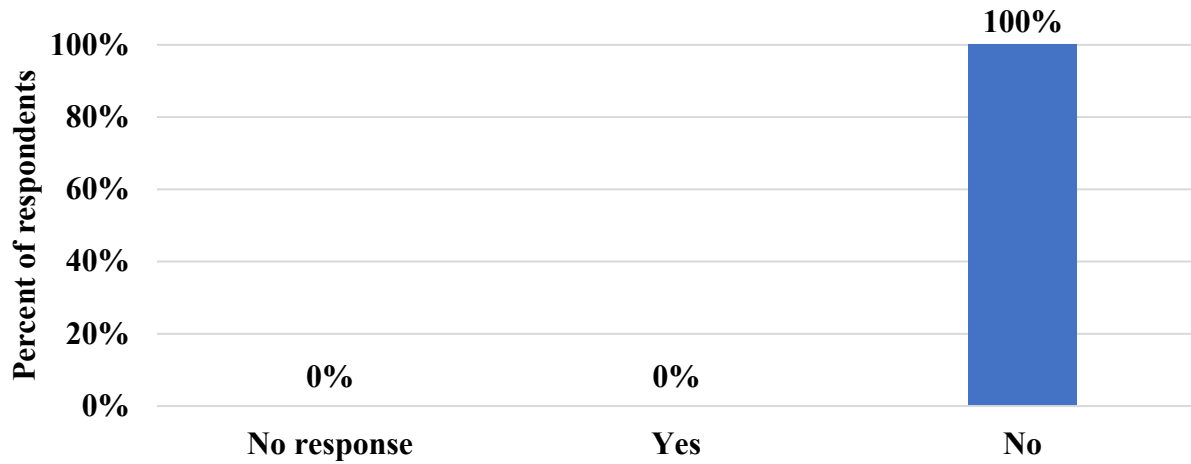
- Lost sales : 67%
- Production challenges (not related to labor) : 58%
- Increased cost of production : 8%
- Labor challenges : 54%
- Increased demand for products : 25%
- Other : 25%



**Q7.1. Has your farm or business experienced lost sales to international or export markets (outside of the United States), as a result of the coronavirus disease (COVID-19)?**

**(n = 18)**

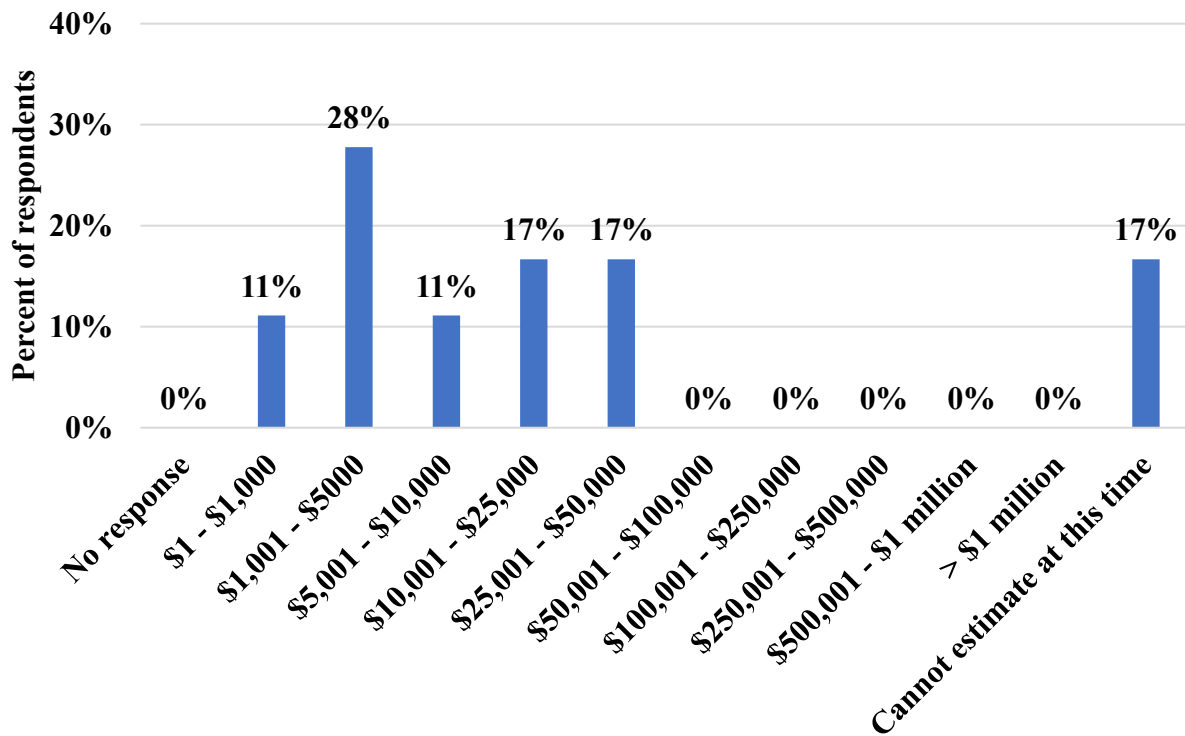
- No response : 0%
- Yes : 0%
- No : 100%



**Q7.2. If your farm or business has experienced lost sales as a result of the coronavirus disease (COVID-19), please estimate the value of lost sales?**

(n = 18)

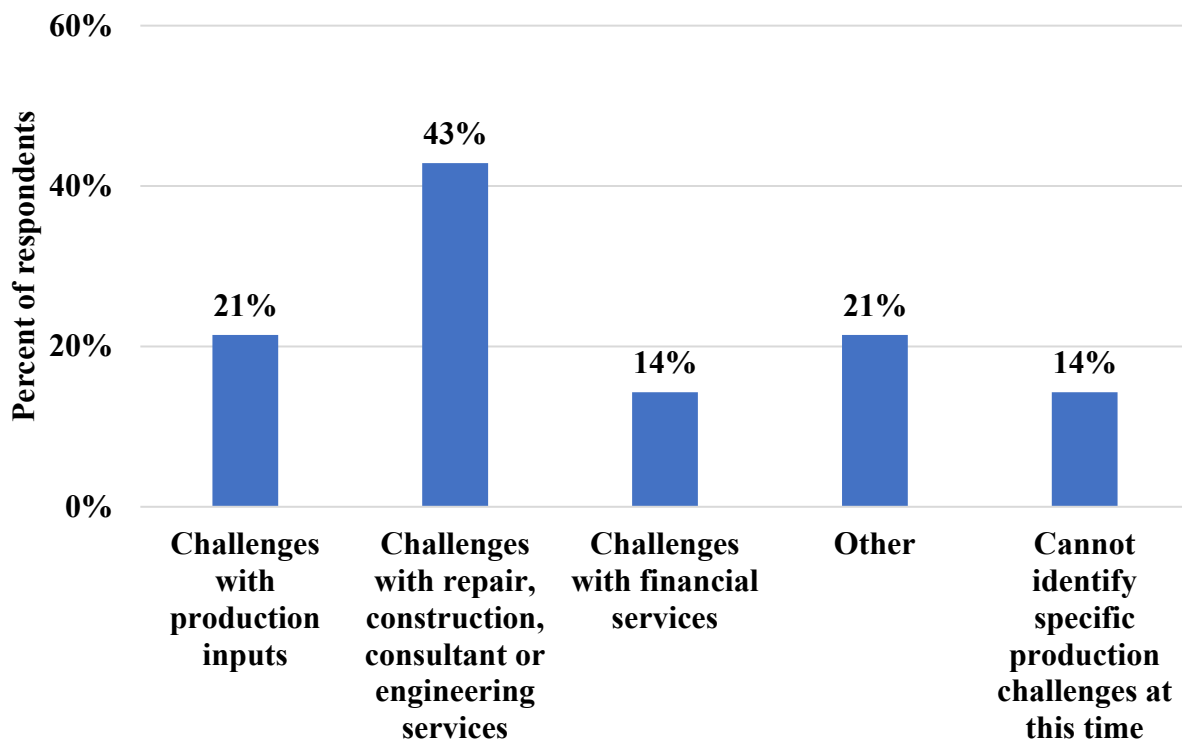
- No response : 0%
- \$1 - \$1,000 : 11%
- \$1,001 - \$5,000 : 28%
- \$5,001 - \$10,000 : 11%
- \$10,001 - \$25,000 : 17%
- \$25,001 - \$50,000 : 17%
- \$50,001 - \$100,000 : 0%
- \$100,001 - \$250,000 : 0%
- \$250,001 - \$500,000 : 0%
- \$500,001 - \$ 1million : 0%
- Greater than \$1 million : 0%
- Cannot estimate at this time : 17%



**Q7.3. If your farm or business has experienced production challenges (not related to labor) as a result of the coronavirus disease (COVID-19), can those challenges be specified? Please select all that apply.**

**(n = 14)**

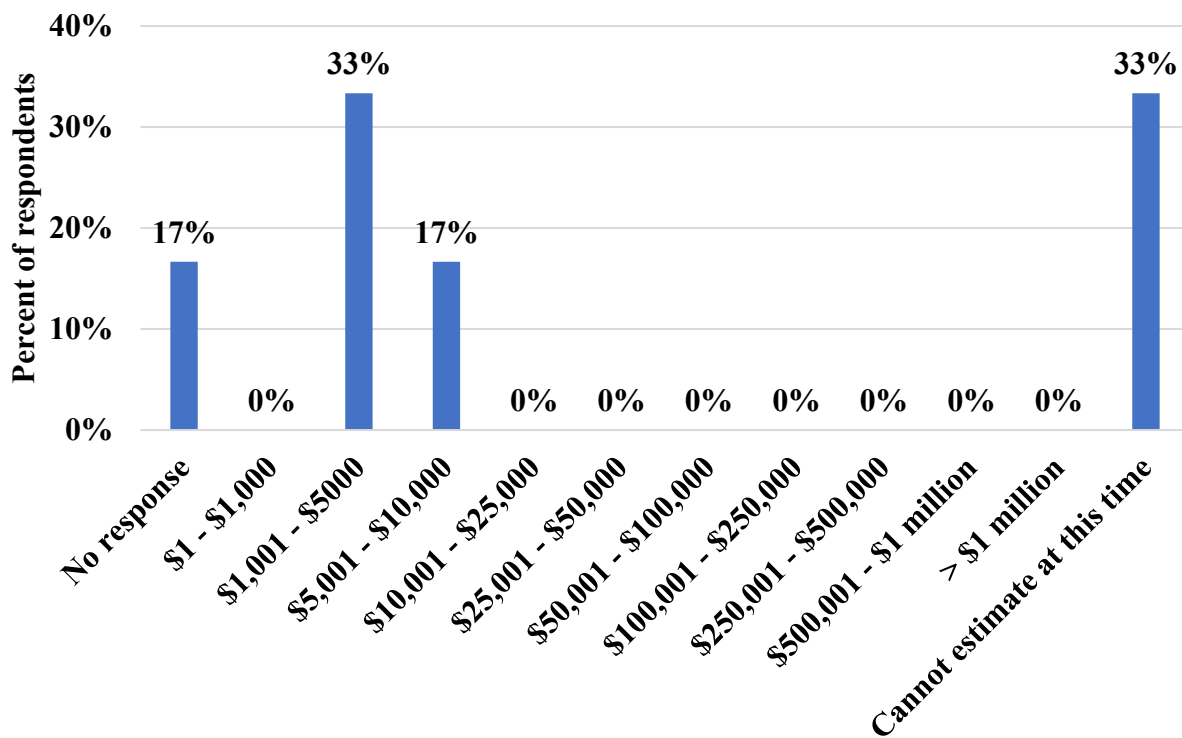
- Challenges with production inputs (feed, chemicals, therapeutants, etc.) : 21%
- Challenges with repair, construction, consultant or engineering services : 43%
- Challenges with financial services (operating loans, leases, etc.) : 14%
- Other : 21%
- Cannot identify specific production challenges at this time : 14%



**Q7.6. If your farm or business has experienced increased demand for products as a result of the coronavirus disease (COVID-19), please estimate the value of those effects on sales?**

(n = 6)

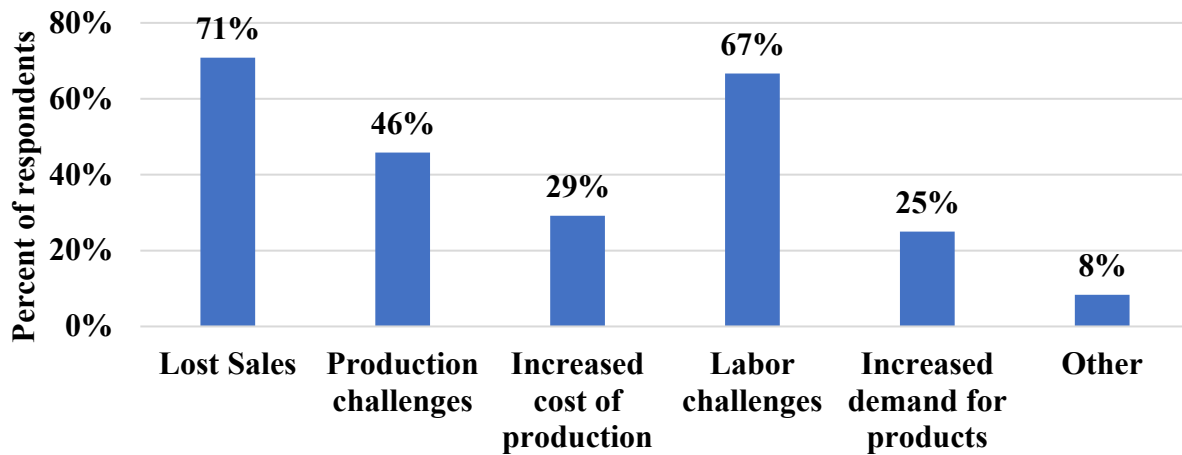
- No response : 17%
- \$1 - \$1,000 : 0%
- \$1,001 - \$5,000 : 33%
- \$5,001 - \$10,000 : 17%
- \$10,001 - \$25,000 : 0%
- \$25,001 - \$50,000 : 0%
- \$50,001 - \$100,000 : 0%
- \$100,001 - \$250,000 : 0%
- \$250,001 - \$500,000 : 0%
- \$500,001 - \$ 1million : 0%
- Greater than \$1 million : 0%
- Cannot estimate at this time : 33%



**Q8. Does your farm or business expect to experience any of the following as a result of the coronavirus disease (COVID-19) in 2020? Please select all that apply.**

(n = 24)

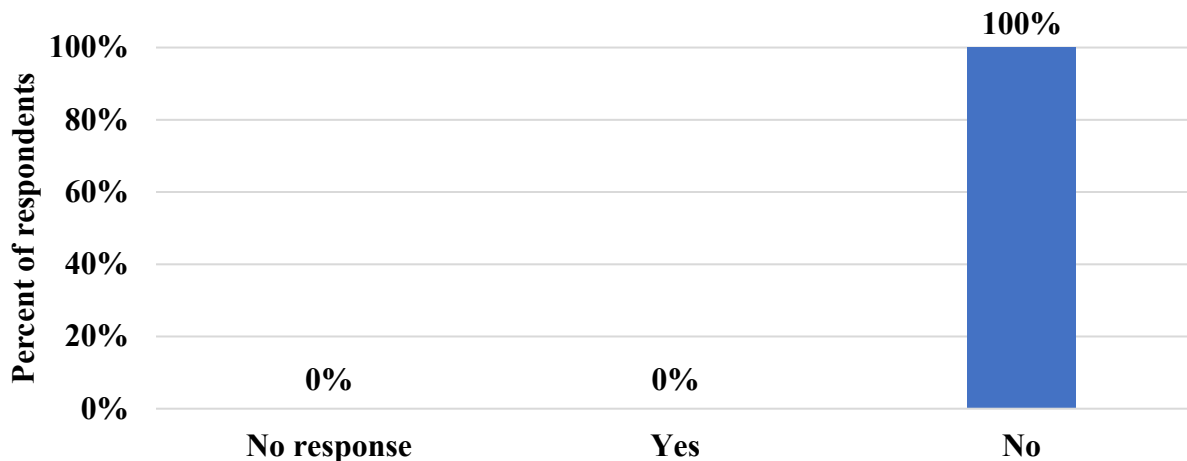
- Lost sales : 71%
- Production challenges (not related to labor) : 46%
- Increased cost of production : 29%
- Labor challenges : 67%
- Increased demand for products : 25%
- Other : 8%



**Q8.1. Does your farm or business expect to experience lost sales to international or export markets (outside of the United States), as a result of the coronavirus disease (COVID-19)?**

(n = 17)

- No response : 0%
- Yes : 0%
- No : 100%

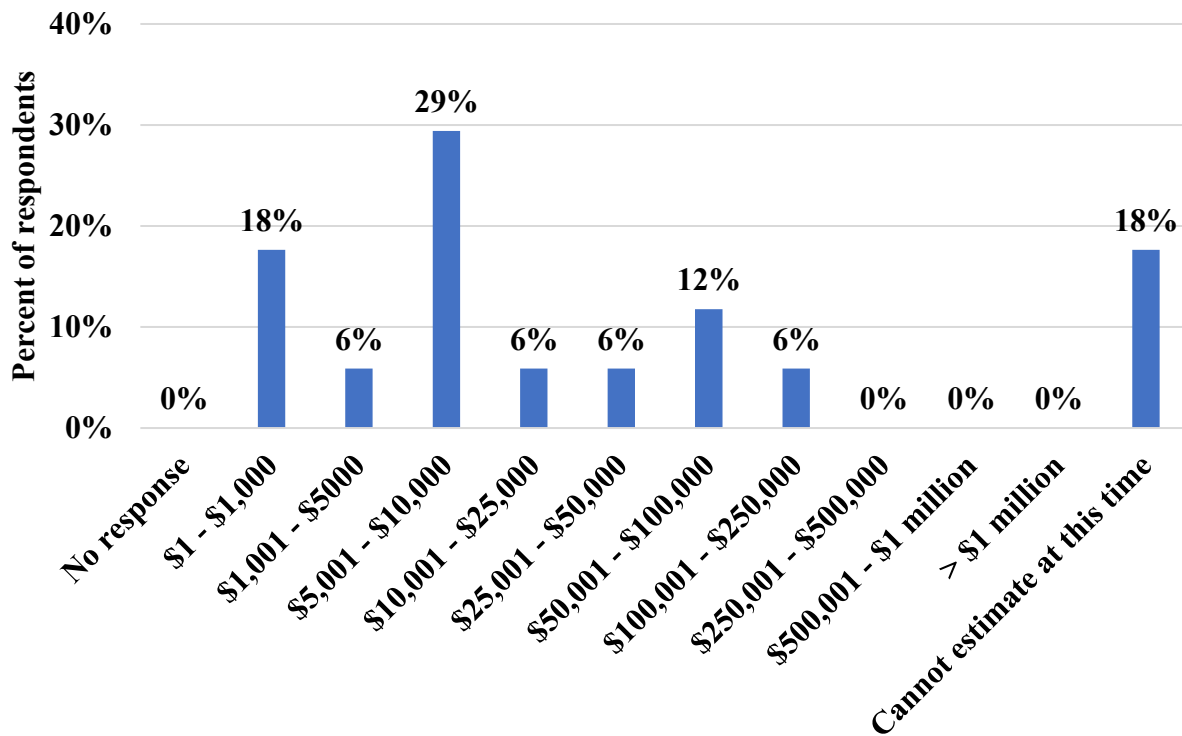




**Q8.2. Does your farm or business expect to experience lost sales as a result of the coronavirus disease (COVID-19), please estimate the value of lost sales?**

(n = 17)

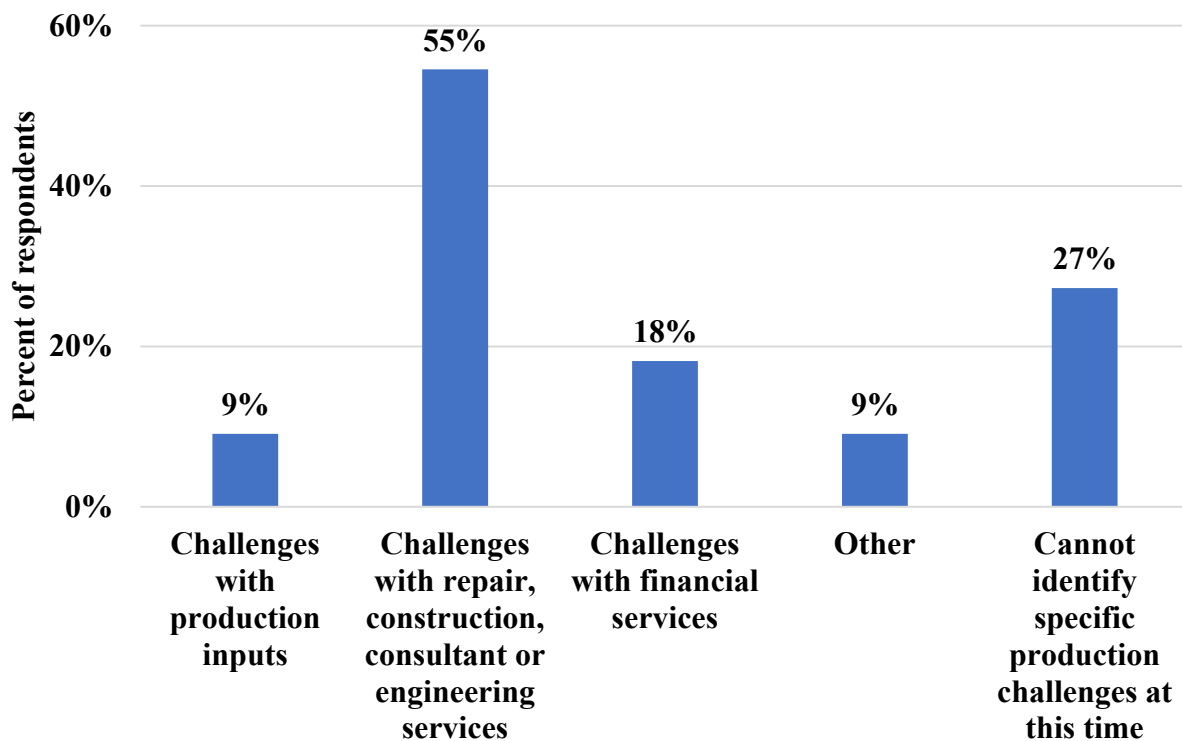
- No response : 0%
- \$1 - \$1,000 : 18%
- \$1,001 - \$5,000 : 6%
- \$5,001 - \$10,000 : 29%
- \$10,001 - \$25,000 : 6%
- \$25,001 - \$50,000 : 6%
- \$50,001 - \$100,000 : 12%
- \$100,001 - \$250,000 : 6%
- \$250,001 - \$500,000 : 0%
- \$500,001 - \$ 1million : 0%
- Greater than \$1 million : 0%
- Cannot estimate at this time : 18%



**Q8.3. Does your farm or business expect to experience production challenges (not related to labor) as a result of the coronavirus disease (COVID-19), can those challenges be specified? Please select all that apply.**

**(n = 11)**

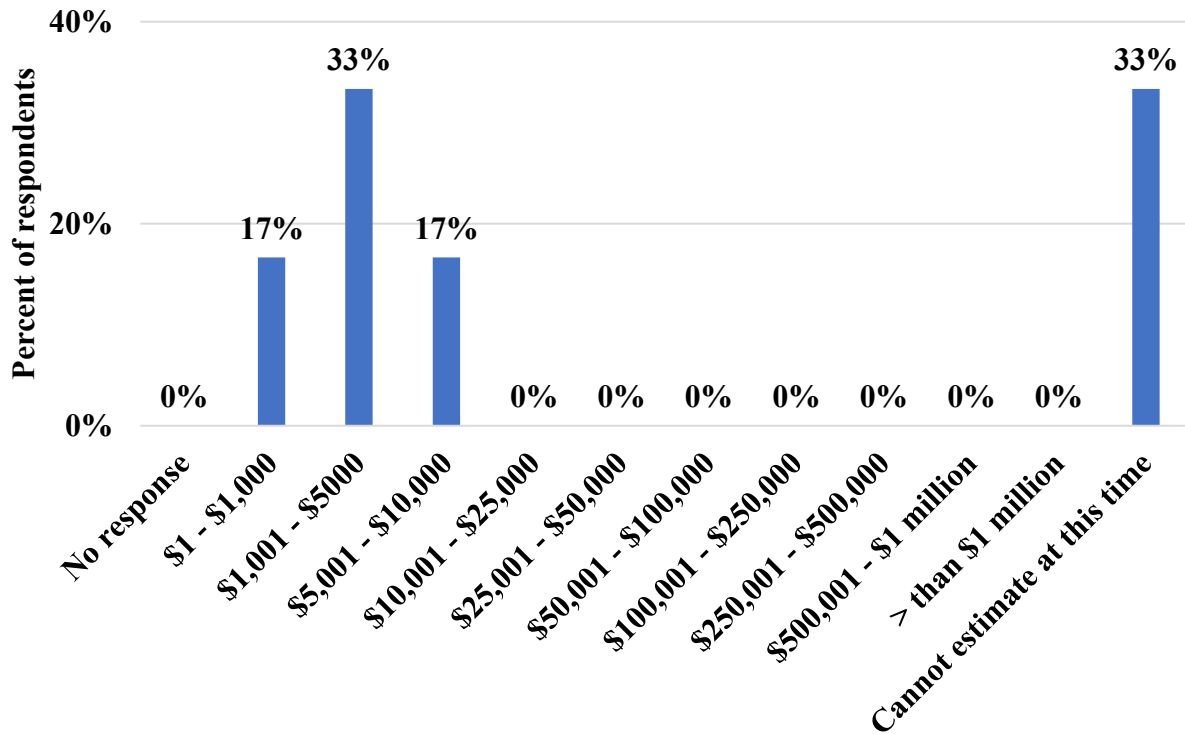
- Challenges with production inputs (feed, chemicals, therapeutants, etc.) : 9%
- Challenges with repair, construction, consultant or engineering services : 55%
- Challenges with financial services (operating loans, leases, etc.) : 18%
- Other : 9%
- Cannot identify specific production challenges at this time : 27%



**Q8.6. Does your farm or business expect to experience increased demand for products as a result of the coronavirus disease (COVID-19), please estimate the value of those effects on sales?**

**(n = 6)**

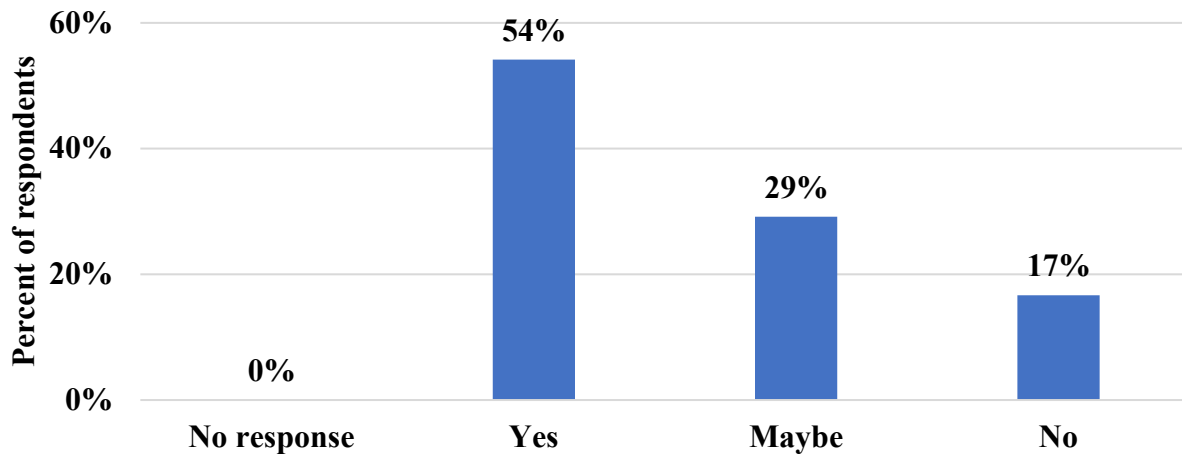
- No response : 0%
- \$1 - \$1,000 : 17%
- \$1,001 - \$5,000 : 33%
- \$5,001 - \$10,000 : 17%
- \$10,001 - \$25,000 : 0%
- \$25,001 - \$50,000 : 0%
- \$50,001 - \$100,000 : 0%
- \$100,001 - \$250,000 : 0%
- \$250,001 - \$500,000 : 0%
- \$500,001 - \$ 1million : 0%
- Greater than \$1 million : 0%
- Cannot estimate at this time : 33%



**Q9. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 3 (three) months?**

**(n = 24)**

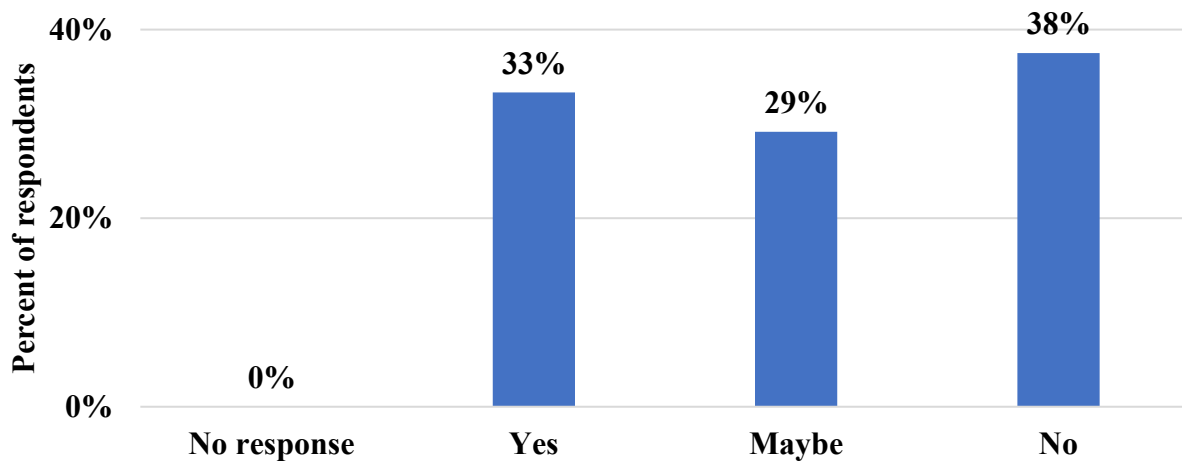
- No response : 0%
- Yes : 54%
- Maybe : 29%
- No : 17%



**Q10. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 6 (six) months?**

**(n = 24)**

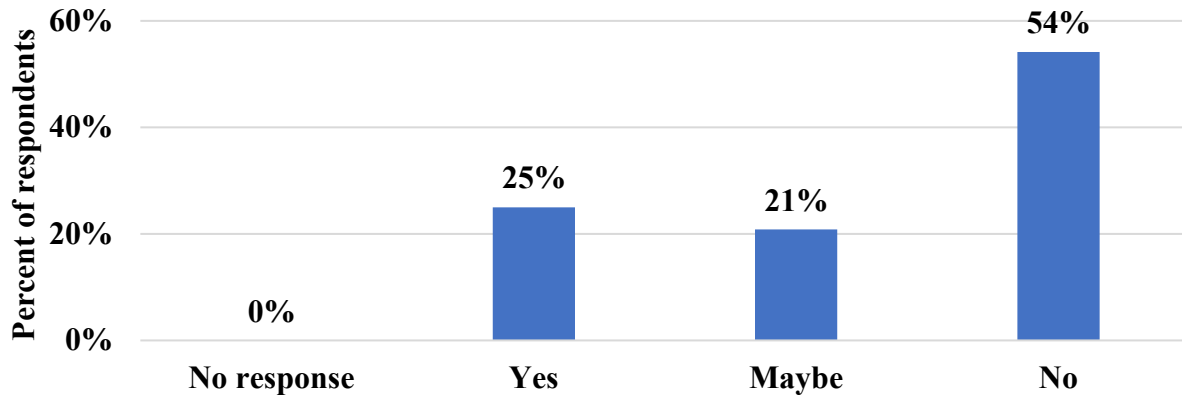
- No response : 0%
- Yes : 33%
- Maybe : 29%
- No : 38%



**Q11. Without external intervention (for example, governmental assistance), will your farm or business survive in the next 12 (twelve) months?**

(n = 24)

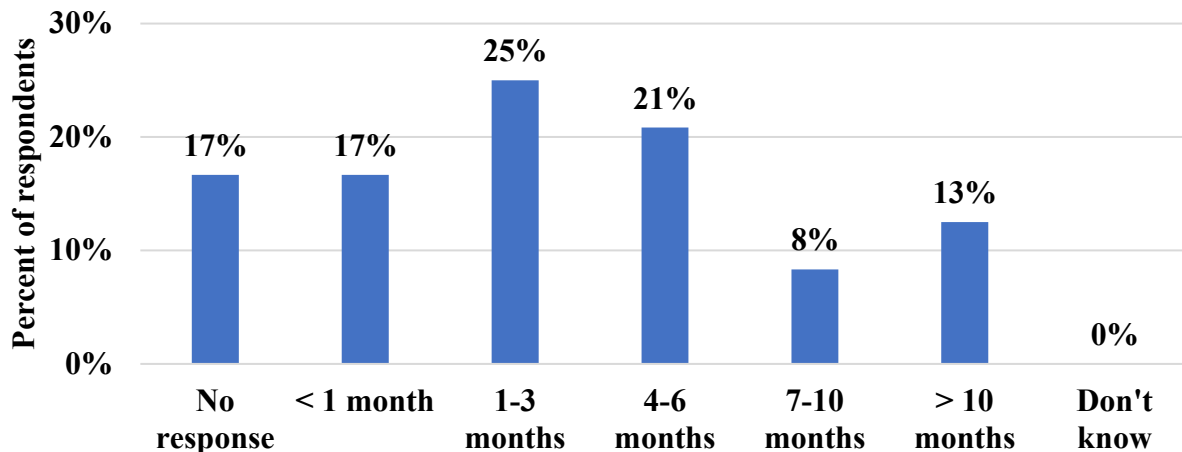
- No response : 0%
- Yes : 25%
- Maybe : 21%
- No : 54%



**Q12. How many months can your farm or business survive without sales, as a result of the coronavirus disease (COVID-19), before suffering longer term cash flow effects?**

(n = 24)

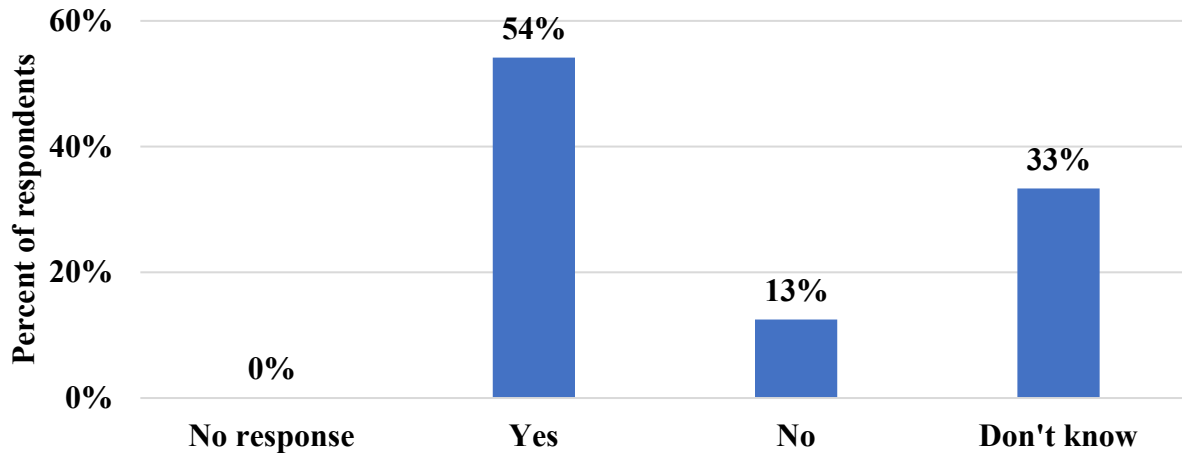
- No response : 17%
- Less than 1 month : 17%
- 1 – 3 months : 25%
- 4 – 6 months : 21%
- 7 – 10 months : 8%
- More than 10 months : 13%
- Do not know : 0%



**Q13. Will holding market ready product, as a result of the coronavirus disease (COVID-19), make it less marketable?**

(n = 24)

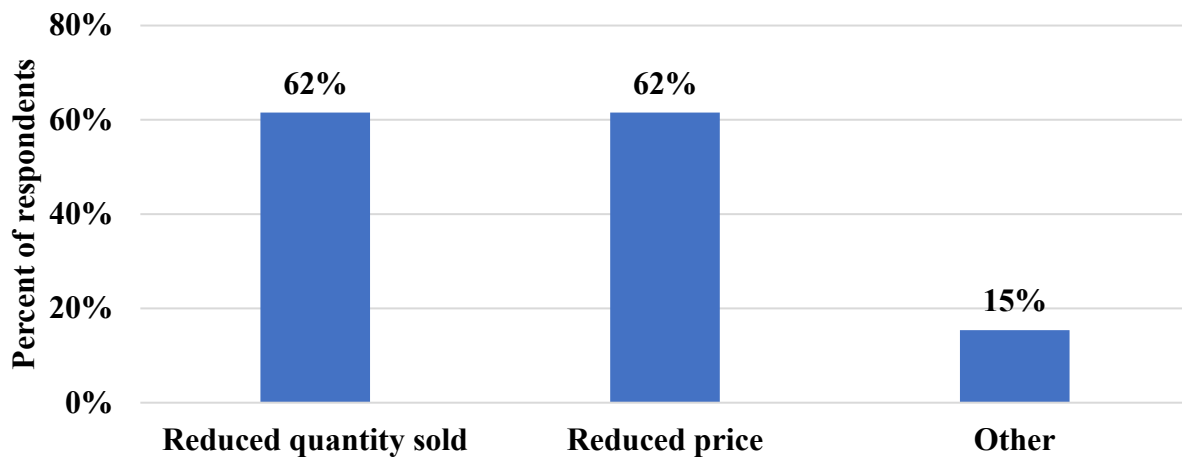
- No response : 0%
- Yes : 54%
- No : 13%
- Don't know : 33%



**Q13.1. Will holding market ready product, as a result of the coronavirus disease (COVID-19), result in: Please select all that apply.**

(n = 13)

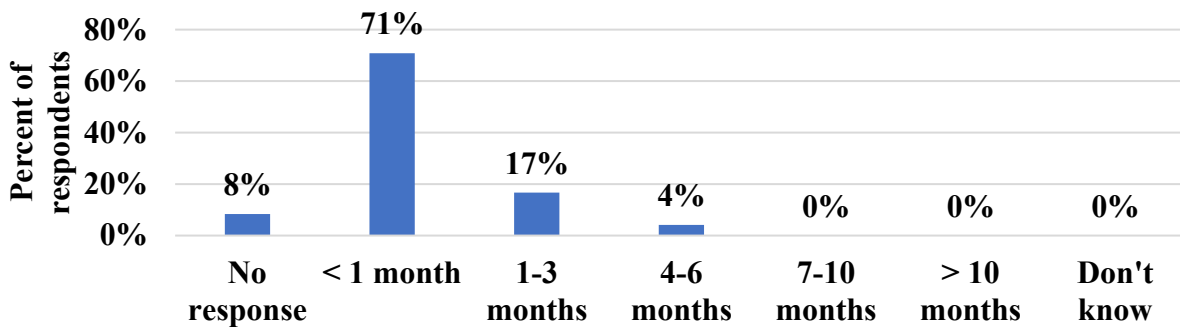
- Reduced quantity sold : 62%
- Reduced price : 62%
- Other : 15%



**Q14. How many months can your farm or business hold market ready product, as a result of the coronavirus disease (COVID-19), before it becomes an issue for new crops or planting?**

(n = 24)

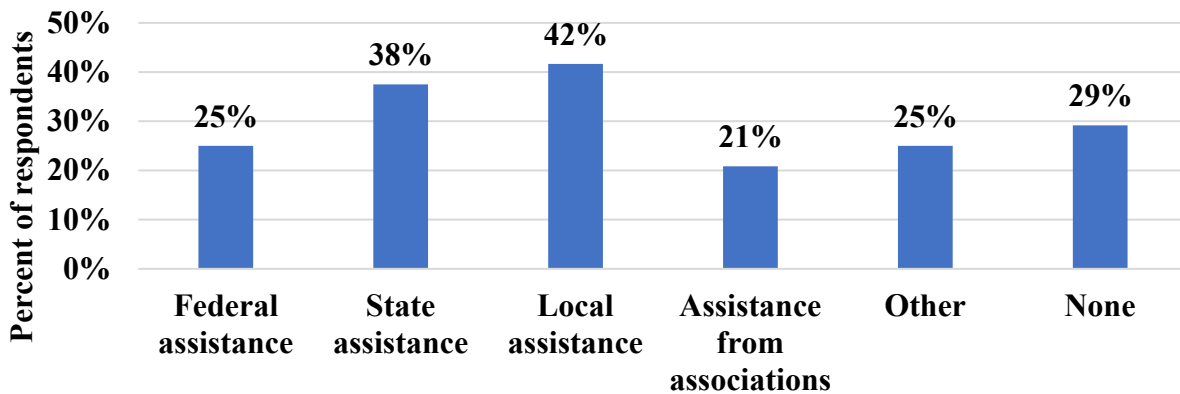
- No response : 8%
- Less than 1 month : 71%
- 1 – 3 months : 17%
- 4 – 6 months : 4%
- 7 – 10 months : 0%
- More than 10 months : 0%
- Don't know : 0%



**Q16. Are there specific steps or types of assistance that would increase the likelihood for your farm or business to survive? Please select all that apply.**

(n = 24)

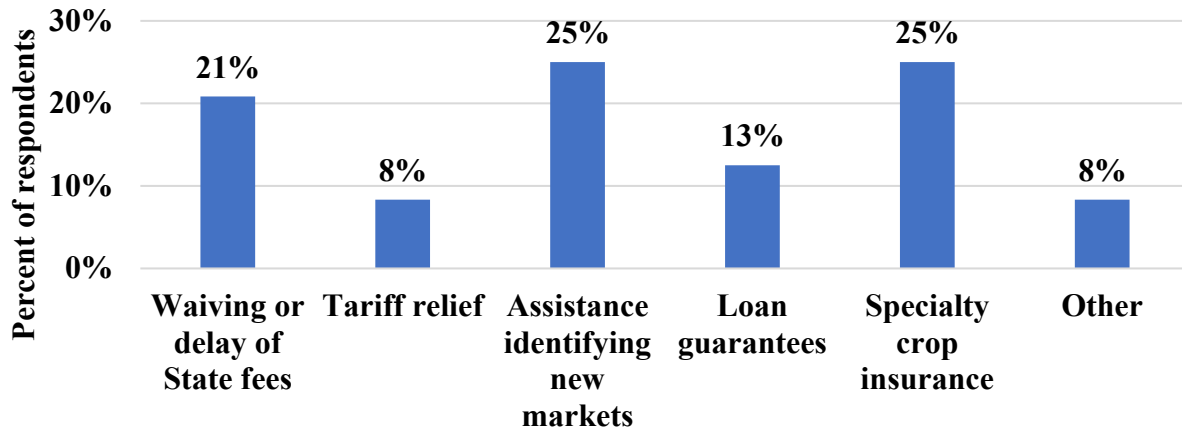
- Federal assistance : 25%
- State assistance : 38%
- Local assistance : 42%
- Assistance from associations : 21%
- Other : 25%
- None : 29%



**Q17. Would assistance with any of the following be helpful to your farm or business right now? Please select all that apply.**

(n = 24)

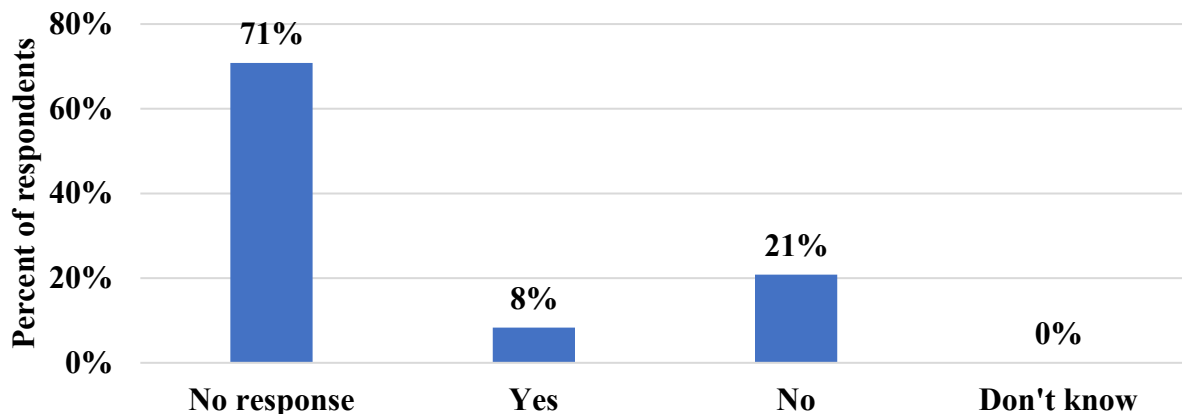
- Waiving or delay of State fees : 21%
- Tariff relief : 8%
- Assistance identifying new markets : 25%
- Loan guarantees : 13%
- Specialty Crop Insurance : 25%
- Other : 8%



**Q18. Are there any existing programs that your aquaculture, aquaponics, or allied business does not currently qualify for, that would increase the likelihood of survival of your farm or business?**

(n = 24)

- No response : 71%
- Yes : 8%
- No : 21%
- Don't know : 0%

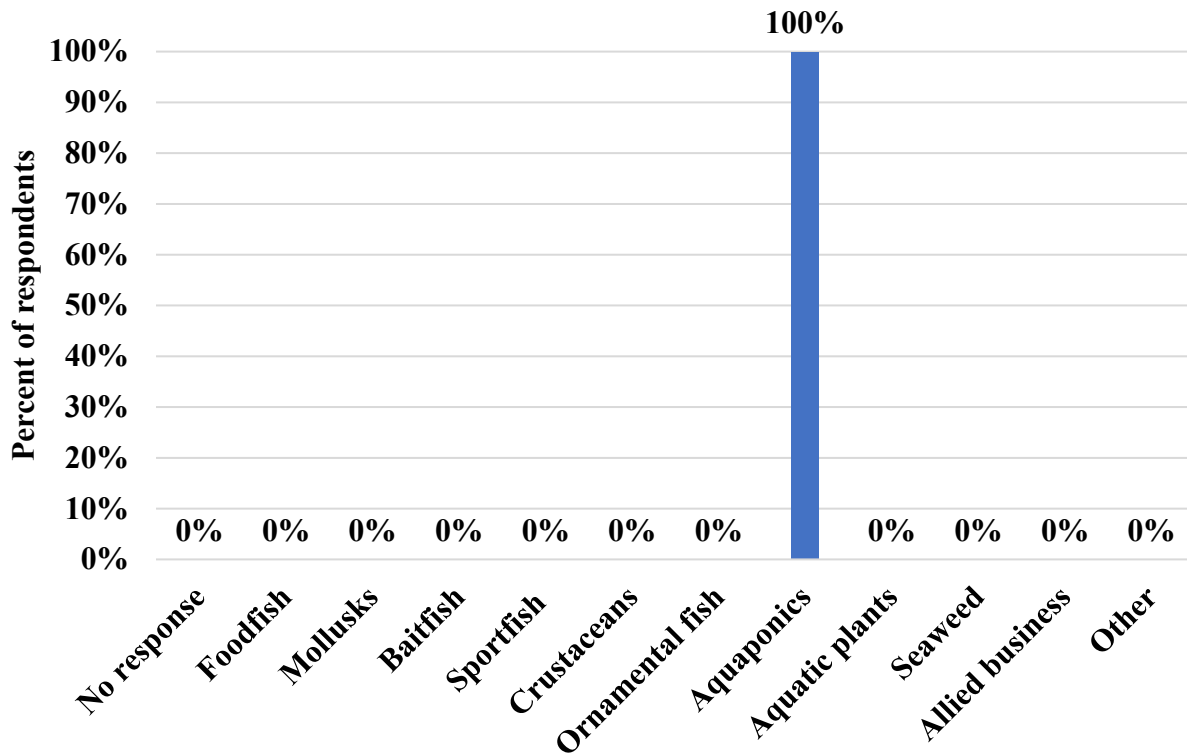




**Q19. What is the primary product that your farm or business produces?**

(n = 28)

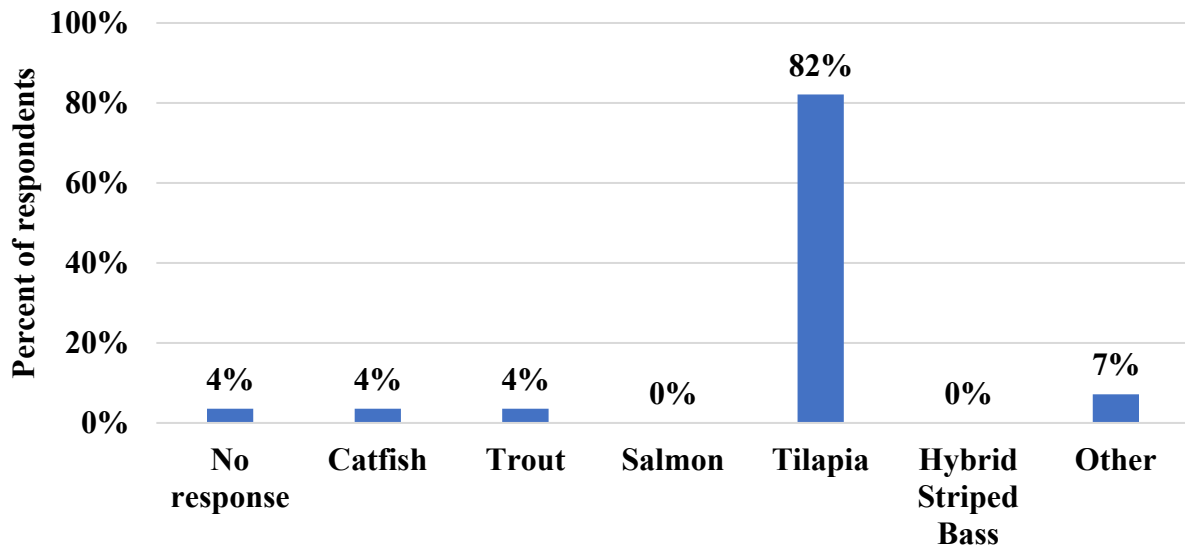
- No response : 0%
- Foodfish : 0%
- Mollusks (oysters, clams, mussels, etc.) : 0%
- Baitfish : 0%
- Sportfish / recreational fish, including trout : 0%
- Crustaceans (crawfish, soft crab, shrimp, etc.) : 0%
- Ornamental fish (aquarium or water garden) : 0%
- Aquaponics : 100%
- Aquatic plants : 0%
- Seaweed : 0%
- Allied business (equipment, chemicals, etc.) : 0%
- Other : 0%



**Q19.1. Please indicate which is the major species of foodfish raised by your farm or business:**

**(n = 28)**

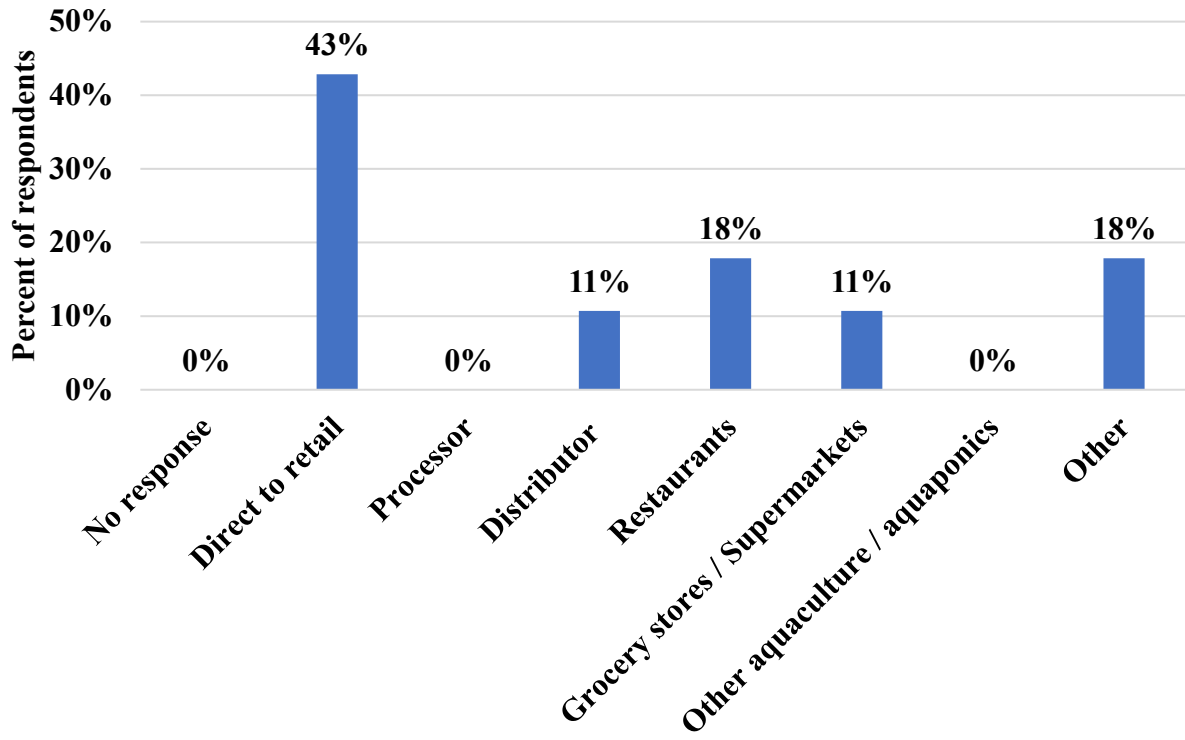
- No response : 4%
- Catfish : 4%
- Trout : 4%
- Salmon : 0%
- Tilapia : 82%
- Hybrid Striped Bass : 0%
- Other : 7%



**Q20. How does your farm or business primarily market or sell aquaculture / aquaponics products?**

**(n = 28)**

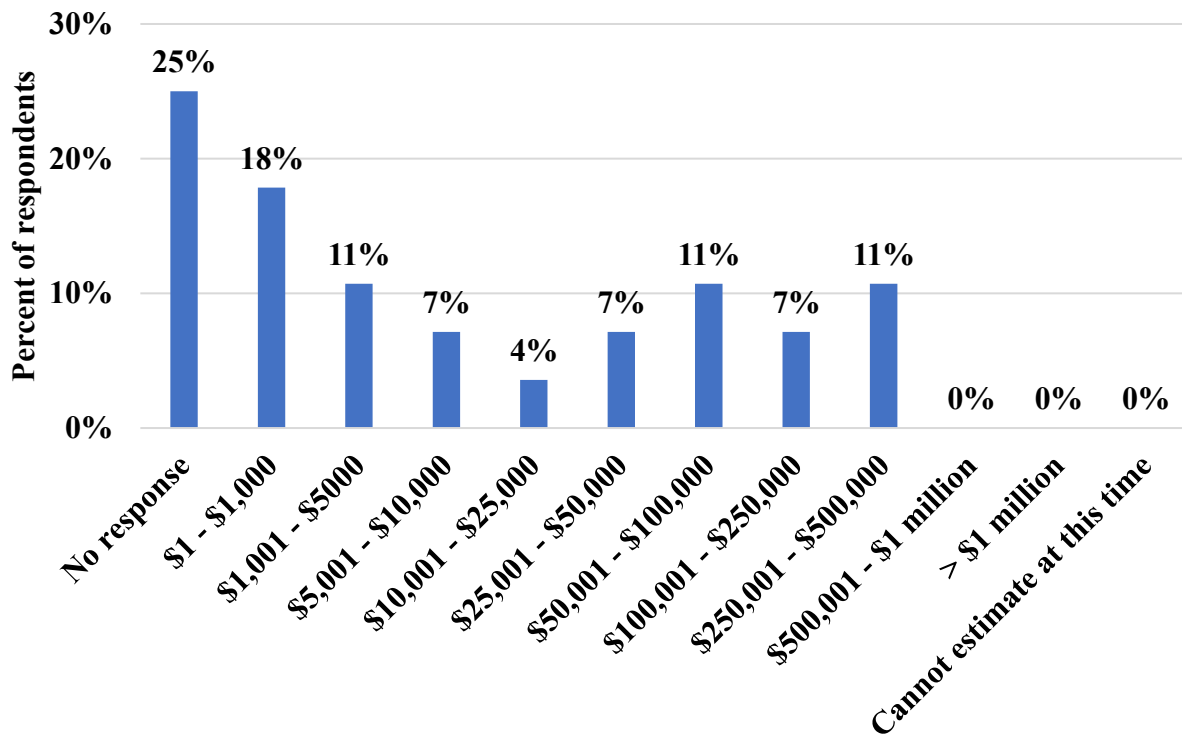
- No response : 0%
- Direct to retail (direct to consumers) : 43%
- Processor : 0%
- Distributor : 11%
- Restaurants : 18%
- Grocery Stores / Supermarkets : 11%
- Other aquaculture/aquaponics farms or businesses : 0%
- Other : 18%



**Q21. Please indicate the scale of your farm or business by annual sales volume before the effects of coronavirus disease (COVID-19):**

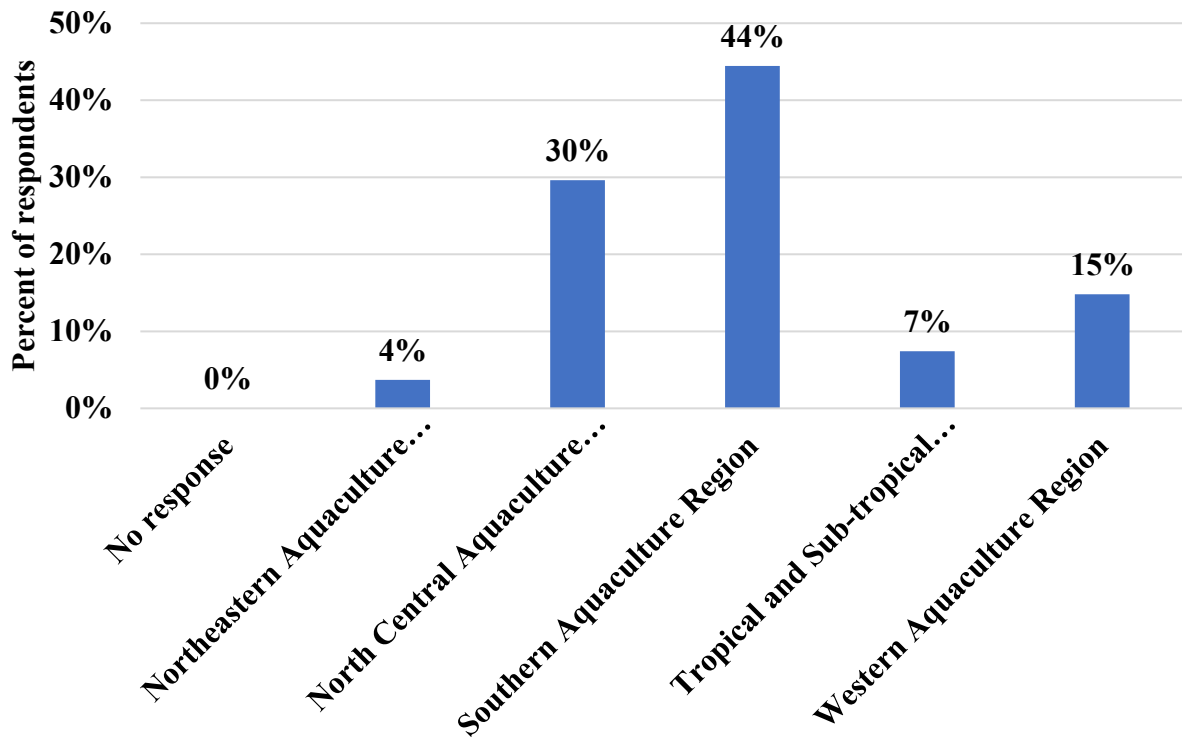
**(n = 28)**

- No response : 25%
- \$1 - \$1,000 : 18%
- \$1,001 - \$5,000 : 11%
- \$5,001 - \$10,000 : 7%
- \$10,001 - \$25,000 : 4%
- \$25,001 - \$50,000 : 7%
- \$50,001 - \$100,000 : 11%
- \$100,001 - \$250,000 : 7%
- \$250,001 - \$500,000 : 11%
- \$500,001 - \$ 1 million : 0%
- Greater than \$1 million : 0%
- Cannot estimate at this time : 0%



**Q22. In which USDA defined Aquaculture Region is your farm or business located?**  
 (n = 27)

- No response : 0%
- Northeastern Aquaculture Region : 4%
- North Central Aquaculture Region : 30%
- Southern Aquaculture Region : 44%
- Tropical and Sub-Tropical Aquaculture Region : 7%
- Western Aquaculture Region : 15%



## References

USDA (United States Department of Agriculture). 2019. 2018 Census of Aquaculture. National Agricultural Statistics Service, USDA, Washington, District of Columbia, USA.  
Accessed April 2020 at:  
[https://www.nass.usda.gov/Surveys/Guide\\_to\\_NASS\\_Surveys/Census\\_of\\_Aquaculture/index.php](https://www.nass.usda.gov/Surveys/Guide_to_NASS_Surveys/Census_of_Aquaculture/index.php).

## Acknowledgements

Thank you to all respondents who participated in this study. Also, thank you to all of the national, regional, and state associations, agencies, Extension, and all others who helped us disseminate the survey. There are simply too many names to list, thanks to all of you.